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ABSTRACT

Providing children and adults with appropriate learning experiences in astronomy is partly dependent upon having materials available with which to teach. This document attempts to provide a systematic approach to the dissemination of astronomy education materials which were not commercially developed and thus have not been widely distributed. This is true for the bulk of astronomy education materials. This publication includes a rationale for using materials and activities in the teaching of astronomy, descriptions of the process used to solicit, compile, edit, and disseminate the material, and descriptions of the materials located in the search. Major sections include descriptions of: (1) instructional media; (2) classroom activities and modules; (3) laboratory lessons and modules; (4) curriculum guides and laboratory manuals; (5) special materials on Halley's Comet; and (6) resource materials and guides. In addition, abstracts of astronomy education materials found in the Educational Resources Information Center (ERIC) database are included, along with information on how to use ERIC. (TW)

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# Astronomy Education Materials

## *Resource Guide*

THIRD EDITION

U.S. DEPARTMENT OF EDUCATION
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# ASTRONOMY EDUCATION MATERIALS RESOURCE GUIDE

3rd Edition

Dennis W. Sunal

and

V. Carol Demchik

Editors

A Project Completed Under The

Astronomy Education Materials Network
Division of Education
College of Human Resources and Education
West Virginia University
Morgantown, WV 26506-6122

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by the

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The completion of this project was due to the help of many people. The assistance of Carol Demchik was of special importance. Her participation in correspondence, analysis, and selection was very effective in bringing the project to a successful conclusion.

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Director
September, 1985

PREFACE

Providing children and adults with appropriate learning experiences in astronomy education has been hindered by a lack of available materials. This publication seeks to foster the teaching of astronomy by providing a systematic approach to dissemination of astronomy education materials which have not been developed commercially and thus have not been distributed widely or distributed at all. This includes the bulk of astronomy education materials. The publication represents the final step in a process involving the collection and editing of information of some of there astronomy materials. The total process involved three major steps.

1. Seeking out and gathering descriptions, and if possible, complete copies of a variety of available astronomy education materials.

2. Summarizing data and disseminating information to potential users of astronomy education materials (Astronomy Education Materials Resource Guideline).

3. Establishing a system for distribution of copies of the astronomy education materials upon request from a materials developer (Astronomy Education Materials Network).

Future activities will involve periodic updating of the listing of available materials, monitoring the system to determine system use and preferred materials and evaluation of materials based on effectiveness and/or goals.

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ASTRONOMY EDUCATION MATERIALS

# RESOURCE GUIDE

# DISSEMINATION OF ASTRONOMY EDUCATION MATERIALS

## WHY USE MATERIALS AND ACTIVITIES IN TEACHING ASTRONOMY?

The teaching of astronomy is a difficult process. Due to the abstract nature of the concepts involved, astronomy units may consist of 70 to 90 percent presentation by text or lecture. Memorization becomes the dominant mode of processing information. The ideas presented have no point of real reference in the students' backgrounds. Spatial relationships of objects are not grasped. Sentences and phrases are memorized because they appear to be important, although not really understood. Students find themselves memorizing even the most concrete parts of astronomy units, names and characteristics of planets, constellations, and stars. This is done with little understanding or even recognition of these objects or events in the real sky.

Since astronomy can involve such ideas as the dynamics of planet orbits or far off stellar systems, facts and concepts are introduced with little or no contact between the student and events which form their existance. Presentation of generalizations in the same manner offers little help. Use of models can offer some assistance to older students. However, most students are unable to transfer information from the learned model to theory (generalizations) or to his/her experiences with the real world.

This dilemma provides the rationale and need for a planned approach toward an astronomy curriculum. A curriculum is needed which involves instruction centered on providing experiences linking personal experiences to facts, models to direct observation, and concepts and theory to models and observation. Three types of instructional activities needed for effective learning in astronomy are: 1) experience and active data gathering, 2) model building, discussion, and reading, and 3) introduction of concepts, generalizations, and theory. In addition, the linkage between these types of instructional activities must be addressed. Personal experience and observation must be transferred to models through construction of concrete representations of events and objects. Manipulation of models should lead to the introduction of concepts and generalizations. Key concepts introduced by this process (and related generalizations) should be checked against the concrete models the students have been using and with direct observations in the field or laboratory.

Only with emphasis on the three different types of instructional activities and the repetition of linkages between them will teaching for understanding of astronomy content occur with the majority of our students. The three types of instructional activities and linkages between them can be graphically shown using a linear flow chart (Figure 1). The double arrow ( ) linkage represents repetitive experiences back and forth between the various types of instructional activities.

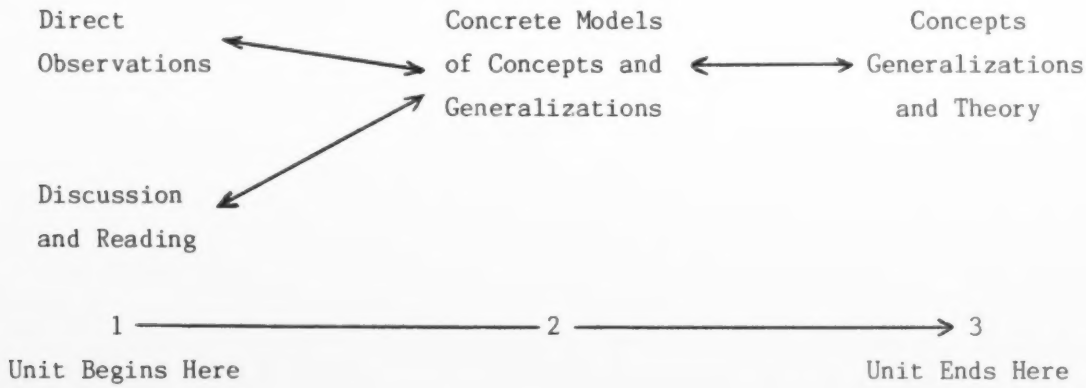



Figure 1
Simple View of Astronomy Teaching Process

However, this diagram has its limitations. Sometimes for older students and adults, ideas to be taught are at least partially understood before the beginning of a unit. We may want to use deductive thinking to help students to understand. Moving from 3 to 1, above, with emphasis on the linkage between them may provide an effective beginning to a unit. A better graphic illustration of the astronomy instructional sequence would be a closed circle (Figure 2).

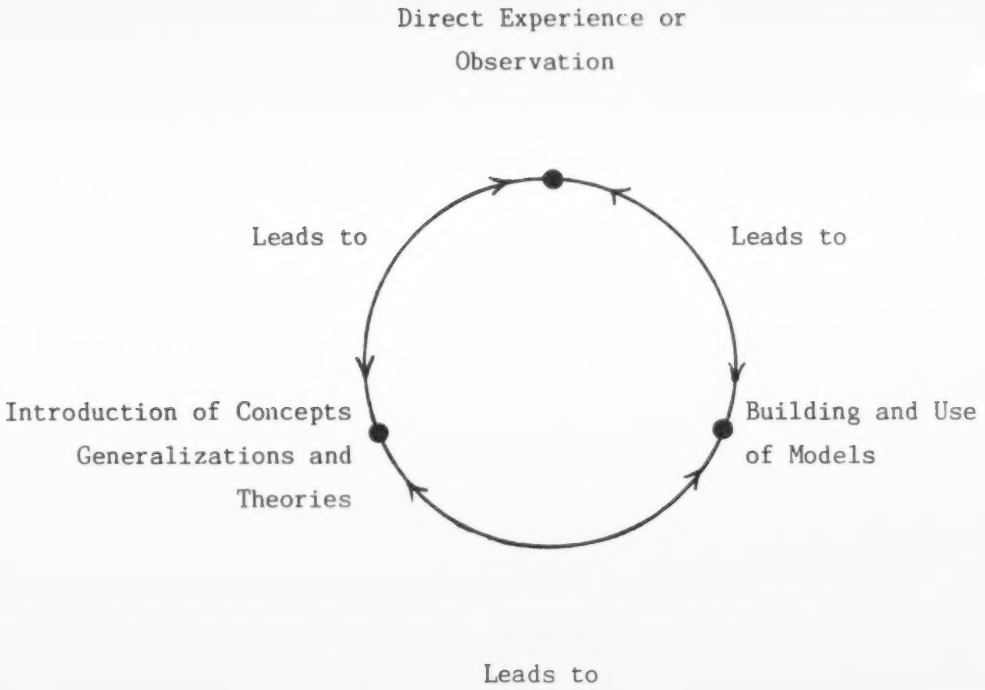



Figure 2
Astronomy Teaching Process

Leaving out any one of the components or not providing repeated linkages will seriously threaten meaningful student learning of astronomy content.

The astronomy curriculum which is illustrated for the student by using this instructional sequence should change with student level. A developmental approach to sequencing the curriculum can be extremely useful when planning units. For instance, planning direct observation experiences can be meaningfully connected with student thought exhibited during three developmental stages as described by Jean Piaget (Table 1).

TABLE 1

Levels and Sequence for an Astronomy Curriculum

| Thought Stage | Representative Ages | Unit Objective Examples (see below) |
|---|---|---|
| Pre-operational | 3 - 5 | I |
| Transition to concrete operational | 6 - 7 | II |
| Concrete operational | 8 - 12 | III |
| Transition to formal operational | 13 - 16 | IV |
| Formal operational | 17 - adult | V |

A small sample of objectives which would enhance the linkages between direct observation model building and concept formation components of astronomy units for each level are listed below.

I. Pre-operational

A. Observe characteristics of objects in the sky.

Observe night, day, dark, and light.
Observe sun, moon, earth, sky, and clouds.
Observe morning, afternoon, and night (day sequence).
Observe sunrise, sunset, dusk, twilight, and dawn.
Observe objects in the day and night skies.

B. Observe changes in the position of objects in the sky.

Observe and record positions of the sun, moon, and clouds.

C. Observe shadows of objects.

Experience shadow play indoors and outdoors.

II. Transition to Concrete Operational

A. Observe changes in the characteristics of objects in the sky.

Moon - shape, color, position
Sun - color, brightness, position
Stars - brightness, color
Clouds - shape, color, position

B. Observe changes in shadows over time.

C. Observe changes in seasons.

Classify changes according to season.

III. Concrete Operational

A. Classify characteristics of objects in the sky.

Observe the characteristics of the sun (hot, movement).
Observe the characteristics of planets and the moon.
Sequence the planets of the solar system in terms of size.
Classify the characteristics of the nine planets, sun, and moon (size, distance, temperature, weight in terms of gravity, color, age, atmosphere, presence of life).
Observe some of the major constellations (Ursa Major and Minor, Orion, the Zodiac, etc.).

B. Observe and record the motion of the sun, moon, and planets across the sky.

Record the daily movement of the sun (day, night, horizon, zenith, azimuth, altitude).
Record the daily movement of the stars, moon, and planets (by season).
Record the annual movement of the stars, moon, and planets (revolution, rotation).

C. Observe and record changes of shadow length over different time periods (direction and path).

Classify the elements necessary to produce a shadow.
Demonstrate solar and lunar eclipses (umbra, penumbra).
Demonstrate how the placement of the light source affects the shadow produced.

D. Observe and record characteristics of seasonal change.

Demonstrate the movement of the earth around the sun in terms of time (day, night, seasons, revolution, rotation, tilt).
Construct a model to demonstrate what is in the current sky.

IV and V. Transition to Formal and Formal Operational

Formulate a model of the solar system.

A. From the earth (including the moon)
Predict the shape and position of the moon on different days.
Formulate hypotheses about the characteristics of the moon and how it affects the earth (tides, soil, eclipses, moonlight, phases, exploration).

B. From the sun
Formulate hypotheses about the characteristics of the nine planets, sun, and moon (size, distance, temperature, atmosphere, weight in terms of gravity, color, life).
Construct a model demonstrating motion within the solar system.
Formulate hypotheses about the phenomena of the sun (sun spots, flares, eclipses, aurora borealis).
Investigate other celestial bodies (meteors, meteorites, comets, asteroids, cosmic dust).

C. From outside the solar system
Identify characteristics of galaxies, nebulae, double stars, clusters, and other large groups in the universe.

Compare the distance in the universe in terms of light years.
Identify the characteristics of a star (color, size, distance, light age).
Formulate hypotheses about the evolving universe.

These objectives require the use of the three basic types of astronomy instructional activities and their repeated linkage together. The Astronomy Education Materials Resource Guide was designed to provide many examples of these basic types of instructional activities. Some of the materials described here constitute whole units and courses. Others may provide you with just the right single activity to help with a unit in astronomy you have had trouble with in the past. Whatever you need, this Guide and the Astronomy Education Materials Network may be the help you need in making your teaching more effective.

## INTRODUCTION

Instructional materials for teaching astronomy or for preparing teachers, museum staff, parks and recreation personnel and other adults to teach astronomy are continuously being developed. Other than through commercial publication, knowledge and dissemination of the great majority of these materials are very limited. While efforts of a number of groups have attempted dissemination of information about astronomy materials, the listings have 1) predominately included commercially produced materials, 2) included only a very small percentage of privately produced non-published materials and 3) failed to develop a retrieval system for obtaining non-published materials. Some of the active groups in this effort have included the Task Group on Astronomy Education of the American Astronomical Society (TGEA Newsletter), Association of Astronomy Educators ( Astronomy Education ), Astronomical Society of the Pacific ( Mercury ), and Sky Publishing Corporation ( Sky and Telescope ).

In order to tap into the great majority of materials which are developed yearly for astronomical education but are generally not communicated outside of local settings, a systematic dissemination approach was needed.

## PROCESS DESCRIPTION

The Dissemination of Astronomy Education Materials Project, now in its fifth year, attempts to solicit and disseminate these non-published or difficult to find education materials used with pre-school through college and adult students, the bulk of existing materials used in teaching astronomy. The mechanism for this effort was the establishment of a system, the Astronomy Education Materials Network (AEMN), providing information about and sources for obtaining these materials.

The establishment of this Network set up a system of 1) soliciting, 2) storing, 3) recording, and 4) distributing information about astronomy education materials. This type of system offers the advantage to those involved in some aspect of the project of being informed of the existence of a portion of these materials and at the same time being given the opportunity to contribute to the dissemination and exchange process. The project was carried out in a four step cycle.

## SOLICITING MATERIALS

Information regarding the project was distributed directly to potential submitters and indirectly through advertisement to the population whose potential involvement in the project was greatest. Complete sets of materials survey forms (see Appendix A) were sent to potential submitters identified as developers of materials or potential developers. Advertisements were sent, describing the project, through mailings and journals to the membership of over 28 organizations. These included among others:

American Association of Physics Teachers - The Announcer , The Physics Teacher
Association of Astronomy Educators - Astronomy Education
Connecticut Science Teachers Association - CSTA Newsletter
Florida Association of Science Teachers Newsletter
Iowa Academy of Science - Iowa Science Teachers Journal
Middle Atlantic Planetarium Society - Constellation
National Association of Geology Teachers Newsletter
National Middle School Association Newsletter

National Science Teachers Association - NSTA Bulletin
- Science and Children
- Science Teacher
- Journal of College Science Teachers
-State Chapters, Associated Groups
-Newsletter editors and permanent contact mailings

Pennsylvania Science Teachers Association - Exchange

Science Teachers Association of New York State - The Science Teachers Bulletin

School Science and Mathematics

Sience Activities

San Diego Science Newsletter

Texas Science Teacher's Association - Texas Science Teacher's Journal

Guidelines for the submission of materials were established as follows:

1. Materials must be easily used at other facilities without major investments and modifications.

2. Developers of materials must be willing to disseminate the materials.

3. Each submission to the network must be accompanied by the materials survey form with all items completed.

4. One complimentary copy of all materials must be submitted with the survey form to provide a review copy for evaluation and establish a clearinghouse for the submitted materials.

## COMPILATION AND EDITING OF MATERIALS

A large variety of material representing hundreds of lessons from over 100 separate sources was received. Approximately 30% was rejected as not being appropriate for the project goals (e.g., pure astronomy content not involving instructional guidelines or previously commercially published materials). The variety of materials included instructional modules, lab and field activities, assessment instruments, developed curricula, films, slide and video tape presentations, games, simulations, planetarium lessons and labs, descriptions of instructional strategies, and computer programs. A summarization format was developed for publication in the Resource Guide . This format included information described in the survey forms sent by the author in addition to evaluative and descriptive statements made by the editors upon examination of the materials. Partial or full text excerpts of the submitted materials were usually avoided.

## DISSEMINATION OF ASTRONOMY EDUCATION MATERIALS RESOURCE GUIDE

The Astronomy Education Materials Resource Guide was distributed to all contributers of information to the guide, all organizations involved in the initial survey and to selected potential users of the guide contacted in the original survey. Advertisement of the Resource Guide will also be made through a variety of organizations. Requests for the guide will be honored on a cost basis, through the West Virginia University Bookstores, College Avenue, Morgantown, WV 26506-6122.

## PROJECT COMPLETION

The end of this cycle of the Dissemination of Astronomy Education Materials Project was evidenced by:

1. an expansion of the solititation system,
2. an expansion of the dissemination system for a unique set of astronomy education materials, The Astronomy Education Materials Network,
3. the inclusion of three special areas of instructional interest, computer software, materials on Halley's Comet and resources in the Educational Resources Information Center (ERIC),
4. a resource library of the involved astronomy education materials now established at the Learning Center, Allen Hall, West Virginia University, Morgantown, WV 26506, and
5. the Astronomy Materials Resource Guide , third edition, with 230 entries and over 1000 separate items described in the materials.

The project has completed a third attempt at compilation of the vast amount of non-commercially published astronomy education meterials which previously have not been available or gathered in one location. This includes lessons and field activities which, as a rule, die with their inventor. This attempt to centralize information should increase interest and enhance public understanding in astronomy in children and adults by providing teachers and other teaching adults with materials for their specialized needs.

Future activities in this area will involve:

1. monitoring the system to determine rate and type of system used,
2. periodic updating of the Resource Guide with newly obtained information on astronomy education materials. this can be done through periodic surveys and dissemination through the Astronomy Education Materials Network,
3. continued distribution of the Astronomy Materials Resource Guide , and
4. evaluation of materials received based on potential effectiveness and/or goals.

Future submission of materials for the updated Resource Guides are encouraged. This requires completion of a materials survey form, see Appendix B, for each item, module, or instructional set of materials submitted. Send completed forms and materials to the Project Director.

## HOW TO USE THE ASTRONOMY RESOURCE GUIDE

A request system for obtaining desired materials has been established as a part of the Astronomy Education Materials Network. Through use of this Astronomy Education Materials Resource Guide the important characteristics of the desired materials can be determined. The descriptions, in most cases, should allow potential users, purchasers, to make decisions on the desirability of the materials. Additional information can be secured by writing the materials developer.

In addition to the descriptions of the material source, source address and cost (including postage) are listed for each entry. If the materials are desired, write (include indicated costs) directly to the source. Do not write the Project Director to secure copies of desired materials. The producer of the materials, as a condition of submission of information to the resource guide, will agree to honor all paid requests for materials. The producer still keeps copyright privileges and achieves limited publication at no or little cost to him/herself. This benefits the producer. The system user gains knowledge as to the extent, nature, and potential usefulness of a wide variety of astronomy education materials.

The user has access to a dissemination system involving the cooperation of a large number of material developers. This benefits the system user. An outline describing the steps in using the Resource Guide follows.

## HOW TO USE THE RESOURCE GUIDE

1. Check the table of contents to determine the range of materials available. Items are listed by type of instructional material and, in addition, provide information on content, target group level, and number of activities.

2. Read each selected entry to determine usefulness of material to your needs.

3. Write, requesting materials from the source address indicated on the entry page. Include all costs indicated. (See Appendix D for sample request form.)

4. To include materials you have developed in the next updated Guide, complete forms in the Appendix and send them along with sample materials to the Project Director.

## RESULTS OF NETWORK USE AFTER FOUR YEARS

Monitoring of the network has been done through receipt of comments, solicited and unsolicited. Correspondence with individuals and solicited comments from 255 AEMN Questionnaires (see appendix C) sent out in the spring of 1985 and in previous years are summarized below in table 2.

| Questionnaire Item # | Item Content | Result |
|---|---|---|
| | Number of Astronomy Education Materials Resource Guides distributed | 2230 |
| Part 1 #3 | Approximate number of requests received by the contributing sources of the guide | 6200 |
| | Average number of requests for each of the contributing sources attributed to the Astronomy Education Materials Resource Guide | 74 |
| | Range | 0 to 352 |
| | Comments - most were favorable, most received few comments | |
| Part 1 #2 | Comments on write up in Resource Guide - one reported some problem on cost, another on purchase order problems, the rest gave "good", "o.k.", or "adequate" responses. | |
| Part 2 #1 | Comments on requests<br>a) fewer requests were made by the contributors to the guide than by non-contributors<br>b) a few reports of non-receipt of a request were noted. | |

Part 2 #2 Comments on request process - The Network

a) comments were overwhelmingly positive and included "well" to "satisfactory"

b) a number (20%) reported slowness in receipt of materials (6 weeks and longer)

Part 2 #3 Comments on quality of materials received

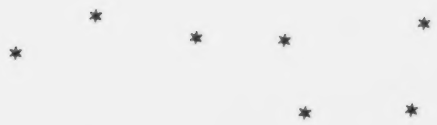
Comments ranged from "overall quality excellent", "yes, worked fine", "mostly useful", "pretty good - we made a few changes to fit in", to "we ordered a number of items, about 25% of which were actually used."

Part 2 #4 Type of material desired in the Astronomy Education Materials Network Guide -

1. high priority
2. low priority
3. should not be included

| | Average |
|---|---|
| A. Curriculum guides for whole grade or many grade levels | 1.8 |
| B. Media (films, slides, pictures, planetarium programs, ...) | 1.5 |
| C. Computer software (type of microcomputer: Apple, PET, TRS-80, ATARI, IBM) | 1.4 |
| D. Instructional program aids (games, manipulatives, equipment,...) | 1.3 |
| E. Astronomy lesson plans (small set or unit) | 1.2 |
| F. Astronomy lab activities | 1.1 |
| G. Resource materials for teaching astronomy (e.g. sky calendar, astronomy information...) | 1.8 |
| H. Workshop guides for teaching astronomy | 1.3 |
| I. Other --Halley's Comet materials and items available through The Educational Resources Information System (ERIC). | 1.2 |

Part 2 #5 Comments about the Network (AEMN) -
Comments include "fills a significant need", "good idea, most helpful", "keep up the good work", "excellent, useful idea."



# ASTRONOMY EDUCATION MATERIALS

# INSTRUCTIONAL MEDIA

ANNULAR SOLAR ECLIPSE--May 30, 1984
(Videotape)

SOURCE ADDRESS Eclipse Tape
WSRE/TV
1000 College Boulevard
Pensacola, FL 32504

COST $10.00+
a blank tape

TARGET GROUP Ages 10 to adult

COMPATABILITY VHS
or 3/4" videocassette

GENERAL DESCRIPTION A videotape of a complete solar eclipse. The tape consists of the following: image formed by eyepiece projection on a screen; description of the projection system and brief scenes of observers with a variety of telescopes; time lapse views of partial phases starting 1 minute after first contact; details of a sunspot immersion; 4 minutes continuous footage during central eclipse; and fourth contact with time signals. The total time of the tape is 13 1/2 minutes.

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ASTRO-AID
(Computer package)

SOURCE ADDRESS Zephyr Services
306 S. Homewood Avenue
Pittsburgh, PA 15208

COST $29.95 + postage

TARGET GROUP Ages 14 to adult

COMPATABILITY Apple II, IBM PC

GENERAL DESCRIPTION Astro-Aid is an integrated software package for handling astronomy calculations and data. It is menu-driven; has 44 astronomical functions; and includes the following: coordinate conversion--equatorial, ecliptic, galactic, alt-az; time conversions--Julian day, Gregorian, sidereal, UT ET solar; basic conversions--distances, temperatures, energy; Kepler's and Newton's Laws, relativity, trigonometry; precession, nutation, aberration, parallax, refraction; telescope design and resolution, coma, diagonal size, fields; equinox and solstice, polaris transits, Jupiter's moons; solar system data-sun, moon, planets, satellites; constellations--names, areas, primary stars, lore; and stars--nearest, brightest, positions, names, spectra.

1. ASTROLAB SET (AOT)
2. PLANETARY ORBITS (A1T)
3. THREE-BODY ORBITS (A2T)
   (Computer simulation)

SOURCE ADDRESS EduTech
Dept. C
PO Box 1715
303 Lamartine St.
Jamaica Plain, MA 02130

COST 1. $135
2.- 3. $75

TARGET GROUP Ages 10 to adult

COMPATABILITY Apple II+; //e; IIc

GENERAL DESCRIPTION

1. These two disks on orbital motion allow the user to explore many phenomena in two- and three-body motion. The high-resolution picture generated by these programs can be printed on a suitable dot-matrix printer connected to the computer. The set consists of two planetary orbit disks, two three-body orbits disks, one Planetary Orbits manual, and one Three-body Orbits manual.

2. Plots the orbits of planets around the sun. The parameters of the nine planets are stored on the disk, but the user is free to enter parameters of a fictitious planet of any radium or eccentricity. Two non-interacting planets orbiting the sun can also be displayed, as can the motion of a planet orbiting two fixed suns. Ideal for studying Kepler's laws. Data sets generated with this disk can be analyzed using DATA ANALYSIS. Comes with a manual.

3. The motion of three bodies interacting gravititionally is displayed in four different modes: 1. Any two planets (real or fictitious) in orbit around the sun. 2. Any planet and its satellite in orbit around the sun: inertial frame. 3. Any planet and its satellite in orbit around the sun: rotational frame. 4. General three-body orbits. Data on nine planets and 32 satellites are stored on the disk. Excellent for demonstrating retrograde motion, synodic period, perturbation, orbital precession, and Lagrangian points. Manual gives many applications.

1. ASTRO LINK DATA PROCESSOR
2. INDOOR ASTRONOMY SLIDE PROJECTOR
3. INDOOR ASTRONOMY VERSION 2
4. INDOOR ASTRONOMER'S SLIDE SETS

(Computer simulation/data base)

SOURCE ADDRESS ASTRO LINK
PO Box 1978
Spring Valley, CA 92077

COST 1. & 2. $39.95
3. $59.95; 4. $10/set

TARGET GROUP Ages 10 to adult

COMPATABILITY Commodore-64

GENERAL DESCRIPTION

1. This advanced yet simple, 2-disk set astronomical data base includes extensive information on 2000 deep-sky objects. You can edit or add more objects. Uses random access files for quick acquisition. It can load and print your indoor astonomy screens.

2. The program displays digitized screen projections of astronomy objects. The slide show is full-featured and uses joystick for all functions including super graphics editing, loading and printing multiple indoor astronomy screens. Choose 2 slide sets free from the selection below in number 4.

3. This 2-disk realistic sky simulation program has more than 8000 obbjects and many features like finder scope, demagnification, planetary orbits, and color printer dump.

4. Digitized screens.
   Set A--Sci Fi Scenes
   Set B--Planetary Nebulaes (realistic screens)
   Set C--Globulars (realistic screens)
   Set D--Galaxies (realistic screens)

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ASTRONOMY EDUCATION MATERIALS NETWORK COMPUTER ACTIVITIES

(Computer programs)

SOURCE ADDRESS Dennis W. Sunal
Division of Education
604 Allen Hall
West Virginia University
Morgantown, WV 26506-6122

COST Free if 2 disks are sent + $1.00 postage and handling
or $3.00 + postage

TARGET GROUP Ages 10 to adult

COMPATABILITY Apple II,//e,IIc

GENERAL DESCRIPTION The disks contain astronomy programs in the public domain. They have been gathered from a number of sources and represent tutorial, simulation, and demonstration instructional strategies. A sample includes Solar System Scale, Comet Orbit, Constellations, Planets, Sirius, Weather Forecast, Star Trader, and Big Dipper.

1. ASTRONOMY KEYWORD
2. SOLAR SYSTEM ASTRONOMY
3. STELLAR ASTRONOMY
(Computer program with lesson planner)

SOURCE ADDRESS Carolina Biological Supply Co.
2700 York Rd.
Burlington, NC 27215

COST 1. $39.00
2 - 3. $30.00

TARGET GROUP Ages 12 to adult

COMPATABILITY Apple II, TRS-80
(2 & 3 IBM PC)

GENERAL DESCRIPTION

1. Aids in developing familiarity with terms associated with space science. Covers vocabulary relative to the sun, moon, solar system, stars, galaxies, constellations, astronomers, and intruments. Presented in a game format. Student's task is to discover unknown term by requesting clues which include synonyms, examples, definitions, and applications.

2. Tutorial instruction using animated color graphics. Disk contents include inner planets, outer planets, greenhouse effect, life in the solar system, history of the solar system, comets, and utility programs for HI-RES printing and graphics. Requires 48K with ROM Applesoft.

3. Tutorial instruction using animated color graphics and sound. Two-sided diskette. Front-side programs cover types of stars, galaxies, constellations, Sirius and the white dward, death of a star, and the Doppler effect. Backside covers scientific and philosophical theories for the origin of the universe. Several auxillary disk files incuding a program to convert DOS 3.3 data to DOS 3.2.1 are provided.

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ASTRONOMY MICROCOMPUTER PROGRAMS
(Computer program)

SOURCE ADDRESS John Mosley
Griffith Observatory
2800 East Observatory Rd.
Los Angeles, CA 90027

COST 4 disks+ $4.00 shipping
or $8 and no disks

TARGET GROUP Ages 14 to adult

COMPATABILITY Apple II

GENERAL DESCRIPTION

This list was compiled in May, 1985. For copies of Apple software in public domain send the disk to the above address.

ATMOSPHERIC SKY PHENOMENA
(Slide presentation)

SOURCE ADDRESS Robert Allen
Physics Department
Cowley Hall
University of Wisconsin
LaCrosse, WI 54601

COST $15.00

TARGET GROUP Ages 15 to adult

POTENTIAL USES
course component
self-instruction

GOAL Introduce the student to sky phenomena.

SPECIFIC OBJECTIVES
1. Observe reflection, scattering, refraction, and dispersion in the atmosphere.
2. Observe how the processes work in atmospheric ice crystals and water droplets to cause rainbows, haloes, sundogs, etc.

NATURE OF ACTIVITIES/CONTENT For use with classes and units dealing with atmospheric phenomena. Useful in helping astronomical observers interpret their own observations of atmospheric events and astronomical phenomena.

GENERAL DESCRIPTION/UNIQUE CHARACTERISTICS It is a slide presentation. Slides may be used in a group, individually, or even in small groups covering a single atmospheric concept.

COMPONENTS (instructor ___ student x )
29 slide set

INSTRUCTIONAL FORMAT
slide presentation

TIME FOR INSTRUCTION
one hour session

EVALUATION OF MATERIALS

NUMBER OF TEST GROUPS ___
NUMBER OF SCHOOLS/INSTITUTIONS ___
TOTAL NUMBER OF STUDENTS INVOLVED ___
EVIDENCE OF EFFECTIVENESS

LOCAL REPRODUCTION LIMITATIONS Local reproduction privileges not granted.

CHARTING THE PLANETS
(Computer progam)

SOURCE ADDRESS Scharf Software Systems, Inc.
211-M 30th Street
Suite 1068
Boulder, CO 80301

COST Contact the source

TARGET GROUP Ages 10 to adult

COMPATABILITY IBM PC, APPLE II APPLE II+, APPLE IIe

GENERAL DESCRIPTION The Tellstar is capable of giving you an accurate view of any nightime sky from the first Christmas to the 31st century. It enables you to "telescope" your view, looking either directly overhead or toward any cardinal point; highlights any visible heavenly body and identifies its exact location in the sky; traces constellations; and identifies the name phase, compass heading, and astronomical coordinates of any star or planet you point to with your cursor. In addition, it allows you to enter right ascension and declination data and obtain immediate conversion to elevation and azimuth coordinates. Author says the program is accurate and complex enough for professional astronomer. its operation is so simple and factinating, though that it can be used to teach astronomy to elemenatary-school children. It comes in two versions: TellStar I, which has star charts for the northern hemisphere only; and TellStar II, which provides charts for the entire world.

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COMMODORE SKY TRAVEL
(Computer simulation)

SOURCE ADDRESS Astronomical League Book Service
1001 S. Cornelia St.
Sioux City, Iowa 51106

COST $26.00

TARGET GROUP Ages 10 to adult

COMPATABILITY Commodore 64 & 128

GENERAL DESCRIPTION The night sky is shown for any date selected. The sky can be viewed from various latitudes. It offers features as good or better than more expensive programs. The complete package is a book explaining the program along with a standard floppy disk. It is considered an excellent education astronomy program.

Computer Labs for Astronomy
(5 computer assisted instruction lessons)

SOURCE ADDRESS John Clayton
17441 Bettles Road
South Bend, IN 46614

COST Free if blank diskette or cassette is mailed, otherwise, cost of cassette

TARGET GROUP ages 10 to adult

COMPATABILITY Pet Commodore 2100

GOAL Introduce students to basic factual astronomical data

SPECIFIC OBJECTIVES
1. Identify basic factual astronomical data about constellations and galaxies.

NATURE OF ACTIVITIES-CONTENT Computer displays a constellation or galaxy type and student identify object or types in answer. Computer responds and gives clue for student to try again or go on. Students are asked to try again or go on.

GENERAL DESCRIPTION-UNIQUE CHARACTERISTICS To help student memorize basic data in the classroom.

COMPONENTS (instructor ___ student x )
requires PET computer with tape deck or floppy disk (Commodore 2100)
modifications for other computers possible

INSTRUCTIONAL FORMAT
computer assisted

TIME FOR INSTRUCTION
open
5 sessions

EVALUATION MATERIAL

| | |
|---|---|
| Number of field test groups | 100 |
| Number of schools-institutions | 10 |
| Total number of students involved | 1400 |
| Evidence of effectiveness | Much better results in field and on written tests |

LOCAL REPRODUCTION LIMITITATIONS Local reproduction priviledges granted for educational uses

FLIGHT INTO SPACE: A PLANETARIUM SHOW AVAILABLE IN TWELVE LANGUAGES
(Sound and projection media for one lesson)

SOURCE ADDRESS Thomas Wm. Hamilton
Wagner College Planetarium
631 Howard Avenue
Staten Island, NY 10301

COST $75.00 for any six languages or $120 for all twelve

TARGET GROUPS ages 10 to adult

GOAL Provide practice in use of a foreign language in a planetarium setting and give exposure to some introductory astronomy.

SPECIFIC OBJECTIVES
1. Experience a description of the night sky in a foreign language..
2. Identify sky objects using a language other than English.
3. Become aware of our solar system and the north circumpolar stars.

NATURE OF ACTIVITIES-CONTENT : Introduction of north circumpolar sky and related constellations. Use of pointers to locate Polaris. A Tour of the Solar System, going from the moon to the sun and then the planets Mercury to Saturn.

GENERAL DESCRIPTION-UNIQUE CHARACTERISTICS A planetarium show available in twelve different languages which gives language classes a chance to exercise language or ethnic groups a show in their language. The languages include: Arabic, Chinese (Mandarin), French, German, Hebrew, Italian, Japanese, Norwegian, Russian, Spanish, Greek, and Portuguese.

COMPONENTS (instructor x student ___ )
instructor's guide
audio tapes
slides
(requires planetarium slide projector and tape player with suggestions for more)

INSTRUCTIONAL FORMAT
planetarium lesson

TIME FOR INSTRUCTION
30-35 minutes depending on language

EVALUATION OF MATERIALS

| | |
|---|---|
| Number of field test groups | 30 |
| Number of schools/institutions | 16 |
| Total number of students involved | 600 |

Evidence of effectiveness Positive evaluation by teachers of classes using the program plus follow up testing in class. Favorable comments from other planetariums who use it with a wide variety of groups.

LOCAL REPRODUCTION LIMITATIONS Local reproduction privileges granted for educational uses.

GALAXY CLASSIFICATION
(Computer program)

SOURCE ADDRESS John Clayton
Riley High School
405 E. Ewing
South Bend, IN 46614

COST Send a blank cassette + return postage

TARGET GROUP Ages 10 to adult

COMPATABILITY Pet, Commodore 2100

GENERAL INFORMATION Galaxy classification shows students a sketch of a galaxy from the top. They are asked to assign the proper classification based upon shape. This is done on a Pet Computer (Commodore 2100) which responds to the student's answer.

LOCAL REPRODUCTION LIMITATIONS Local reproduction privileges not granted.

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1. JOURNEY TO THE STARS
2. JOURNEY TO THE SOLAR SYSEM
(Computer program)

SOURCE ADDRESS Paul J. Bengtson
COMPress
PO Box 102
Wentworth, NH 03282

COST 1. $60 2. $39.95
Copy + Manual

TARGET GROUP Ages 10 to adult

COMPATABILITY IBM/pc, PCjr, COMPAQ

GENERAL DESCRIPTION

1. An educational program in astronomy that simulates the night sky. Using high resolution graphics, this program simulates 1400 of the brightest stars. The computer displays changes by constellation, bright star, hemisphere, and observer location. Activities and games show how to plot and pinpoint segments of the sky, stars, or constellations of your choice. Ten separate programs are available including tutorials, games, and simulations.

2. The user can see graphic illustrations of the physical and spatial properties of the solar system. The program looks at the nine major planets with satellites, meateors, comets, and asteroids as well as the moon and the sun and how they affect the earth.

LEARNING THE NIGHT SKY
(2 cassette tapes)

SOURCE ADDRESS Tapes Department
Astonomical Society of the Pacific
1290 24th Avenue
San Francisco, CA 94122

COST $16.95

TARGET GROUP Ages 10 to adult

POTENTIAL USES
classroom
field
self-instruction
teacher education

GOAL Introduce observers to the night sky, constellations and basic observing techniques for finding prominent stars and star groups.

SPECIFIC OBJECTIVES
1. Name constellations which are prominent in each of the four seasons.
2. Identify the location of prominent constellations and stars in each of the four seasons.

NATURE OF ACTIVITIES/CONTENT The tapes provide guided tours of the heavens for each of the four seasons. They are field tested both in a planetarium and outdoors and are accompanied by a full transcript and four specially designed seasonal star maps.

GENERAL DESCRIPTION/UNIQUE CHARACTERISTICS The kit contains sound cassettes, transcipts, and maps .

COMPONENTS (instructor x student x )
2 cassette tapes
maps and information sheets.

INSTRUCTIONAL FORMAT
printed materials
cassettes

TIME FOR INSTRUCTION

EVALUATION OF MATERIALS

NUMBER OF TEST GROUPS ____
NUMBER OF SCHOOLS/INSTITUTIONS ____
TOTAL NUMBER OF STUDENTS INVOLVED ____
EVIDENCE OF EFFECTIVENESS In use at thousands of schools around the world.

LOCAL REPRODUCTION LIMITATIONS Local reproduction privileges not granted.

1. MOON AND SUN
2. ECLIPSE MAP
3. PLANETARIUM
4. ORREY
5. PLANETS
6. WORLD MAP

(Computer simulations/data bases)

SOURCE ADDRESS Charles Kleupfel
11 George Street
Bloomfield, NJ 07003

COST 1. $27; 2. 25
3 & 5. $23; 4. $20
6. $30

TARGET GROUP Ages 10 to adult

COMPATABILITY Apple and Commodore 64

GENERAL DESCRIPTION

1. Provides information on all aspects of eclipses (lunar and solar), central line, local circumstances, and occulations with 1 mile accuracy.

2. High-resolutions map of area of visibility of solar eclipse. Usable for occultations also if Number 1 is used.

3. Stars and planets in a high-resolution sky display are given for any date or latitude. A 2-screen quick-flip is used to demonstrate rotation about pole, season differences, or precession. One can flip between sky and Number 4 display.

4. Self-updating solar system diagram in high-resolution with date display.

5. A simulation of solar system planets with Sun and Moon, giving data on Gregorian/Julian/Jewish calender conversions, helio-, geo-, and topocentric coordinates, star identification feature; rising and setting times, etc.

6. Shows world map in animated high resolution with day/night, moonrise/set line, flashing +'s where sun and moon are directly overhead; ecliptic, lunar nodes and perigee projected onto surface; continual real-time update every 5 minutes, static display, or rapid (1 hr/4 min.); and date and time.

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NORTHSTAR
(Computer lesson)

SOURCE ADDRESS Dan Kanyuck
301 South Main St.
Brooksville, FL 33512

COST $5.00

TARGET GROUP Ages 10 to 14

COMPATABILITY TRS-80 MODEL 3

GENERAL DESCRIPTION Students learn how to find the North Star using the Big Dipper and its pointer stars. The activities involve computer assisted instruction using graphics and question and answer instructions to guide the student. Documentation is found on the disk. The materials have been evaluated with three test groups in one school. The students who have completed the program have been able to go out and locate the North Star.

THE OBSERVATORY
(Computer simulation)

SOURCE ADDRESS Lightspeed Software
2124 Kittredge Street
Suite 185
Berkeley, CA 94704

COST $125

TARGET GROUP Ages 10 to adult

COMPATABILITY Apple II+ or //e

GENERAL DESCRIPTION Shown on the screen are stars, constellations, planets, moons, and other celestial objects, just as you'd see them from any specified point on the earth, at any time in any year until 10,000 A. D. The program is a good educational tool for schools or public libraries. It offers many features and displays opproximately 310 stars and another 110 celestial bodies on the computer screen. It is easy to use, with most options activated and deactivated by a single keystroke. More than 40 control options include moving forward or backward in time, rotating the display, zooming in to magnify up to 512 times, centering and tracking an object, displaying constellation outlines, and creating crude graphics representations of eclipses.

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1. OUR FUTURE IN SPACE
2. FUTURE SPACE CAREERS
(Videotapes)

SOURCE ADDRESS Space Futures Education
Robbinsdale Area Schools
4139 Regent Av. No.
Minneapolis, MN 55422

COST $65/VHS & Beta
$75/ U-matic
Special prices for schools in Minnisota.

TARGET GROUP Ages (1) 8-11
(2) 12-15

GENERAL DESCRIPTION
1. A quick review of what's been done in space by humans so far leading to a projection of what might be happening in the students' lifetimes with space stations, moon mining and large space habitats.

2. Solid math and science background is needed for space careers. Here, implications of the routine industrial use of the space environment are explored. A brief summary of human space exploration leads through the Shuttle Era into possible long-range futures with large space colonies. Strong emphasis is placed on the need for a solid math/science foundation in junior and senior high school for future careers in space.

SATELLITE ORBITS
(Computer tutorial)

SOURCE ADDRESS J. Harris
Chelsea Science Simulation Project
Chelsea College, London

COST $45.00

TARGET GROUP Ages 14 to adult

COMPATABILITY Apple (phy145a)
Pet (phy130p)
TRS-80(phy130t)

GENERAL DESCRIPTION This package helps students see how Newton's Second Law and Law of Gravitation lead to the prediction of satellite orbits. The program uses an iterative method to calculate the path of a satellite launched horizontally. The student finds the initial velocity and height needed for the minimum circular orbit. Students can also use the program to compare the period and shape of different orbits. Notes and students' leaflets (16 pages) and software on one diskette.

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SOFTWARE REVIEWS: STAR SEARCH
(Computer simulation)

SOURCE ADDRESS Earthware Computer Services
2386 Spring Blvd.
P. O. Box 30039
Eugene, OR 97403

COST Contact the source

TARGET GROUP Ages 10 to 18

COMPATABILITY Apple II

GENERAL DESCRIPTION Star Search is educational software aimed at stimulating student interest in earth science and astronomy. It is very flexible, allowing students with only minimal knowledge to work with it, and at the same time letting experts be challenged. The basics of the program are explained well, but students needing more instruction may find some of the instructions not detailed enough. Since it is a game format, it is good at motivating students. The player receives a signal from outer space and must find its source. He is captain of a space ship and must discover extra terrestrial life forms and communicate with them, learn about the planetary system, and return to the main Pluto Base safely. The game has 3 difficulty levels and up to four people can play. Each captain must select 4 to 8 crew members from 16 professions, supply the ship with scientific equipment, then take off and investigate planets. Ships can collaborate or go off alone. Game is over if a ship cannot return home or after 20 turns.

Sky Challenger - Guides and Games for Star Gazers
(Star guides and games)

SOURCE ADDRESS
Discovery Corner
Lawrence Hall of Science
University of California
Berkeley, CA 94720

COST $5.95+
shipping = $2.25/1
$3.00/2-4
$3.50/5-6

TARGET GROUPS ages 10 to adult

POTENTIAL USES
course component
self instruction
large group activity
(Boy Scouts, etc.)
teacher education

GOALS To introduce people to the use of star charts and basic concepts of astronomy.

SPECIFIC OBJECTIVES :
1. Locate constellations, planets.
2. Construct your own constellation.
3. Use binoculars on sky objects.
4. Tell time by the stars.

NATURE OF ACTIVITIES-CONTENT This is a unique star finder with interchangable star wheels showing locations of constellations at different months of the year. Can be demonstrated and used in classrooms and out of doors.

GENERAL DESCRIPTION-UNIQUE CHARACTERISTICS This is an excellent way for students, teachers, groups or any amateur to learn star constellations or observable planets. Uses games and easy to read charts to make night sky observations fun and interesting.

COMPONENTS (instructor x student x )
group leader's guide available upon request.
Sky Challenger
a. Beginner's Star Wheel
b. Native American Constellations
c. Binocular Treasure Hunt
d. Find the Planets
e. Test Your Eyes
f. Invent Your Own Constellations
binoculars or small telescope optional

INSTRUCTIONAL FORMAT
star wheel with interchangable parts
lab, demonstration, observation session using star finder

TIME FOR INSTRUCTION
one lesson to many lessons or open to unstructured student use

EVALUATION OF MATERIALS

| | |
|---|---|
| Number of field test groups | 100 |
| Number of schools-institutions | 30 |
| Total numbr of students involved | several 100 |

Evidence of effectiveness Thousands of questionnaires filled out after use were extremely favorable.

LOCAL REPRODUCTION LIMITATIONS Limited by copyright.

STAR CHART FOR LEARNING CONSTELLATIONS
(Star chart)

SOURCE ADDRESS Richard Moesehl
435 Pinewood Drive
San Rafael, CA 94903

COST $1.00

TARGET GROUP Ages 10 to adult

GOALS To help students recognize the constellations of the northern and southern hemispheres and to locate the zodiac, ecliptic, equator, poles, and equinox points.

SPECIFIC OBJECTIVES
1. Provide information for observation of the constellations.
2. Enable the entire sky to be viewed on a single chart.

NATURE OF ACTIVITIES/CONTENT A single chart of the entire sky in 3 interwoven sections (north and south poles and celestrial equator) to minimize distortion and the fragmenting of constellations. Connecting lines have been drawn between the stars to suggest shapes of the constellations as recorded by Ptolemy in 148 A. D.

COMPONENTS (instructor ___ student x )
1 page star chart

INSTRUCTIONAL FORMAT
chart

EVALUATION OF MATERIALS

NUMBER OF TEST GROUPS 5
NUMBER OF SCHOOLS/INSTITUTIONS 2
TOTAL NUMBER OF STUDENTS INVOLVED 100
EVIDENCE OF EFFECTIVENESS Student receptivity and large circulation

LOCAL REPRODUCTION LIMITATIONS Local reproduction privileges granted for educational uses.

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STARCHART
(Computer simulation)

SOURCE ADDRESS 1984 Visionary Software
PO Box 1063
Midland, MI 48640

COST $59.95+
$3 postage and handling

TARGET GROUP Ages 10 to adult

COMPATABILITY Apple II

GENERAL DESCRIPTION It is a user-friendly, variable-date, star-atlas program for the Apple II computer. It features variable epoch, extensive data base with all bright constellation stars, all Messier objects, and many NGC objects. Descriptive graphics indicate relative stellar magnitudes and object type. Printout or screen display includes objects' names, r.a., dec., magnitude or type, and spectra. It also has variable scale of view, on-line help screens, and a detailed user manual.

1. STARGAZER'S GUIDE
2. TELL STAR I
3. TELL STAR II
4. PLANETARY ORBITS
5. ORBITS
6. MODERN ASTRONOMY DEMONSTRATIONS
7. SPACE STATION
8. RENDEZVOUS
9. SATURN NAVIGATOR
10. SOLAR SYSTEM ASTRONOMY
11. STELLAR ASTRONOMY

(Computer simulations/tutorials)

SOURCE ADDRESS Cambridge Development Laboratory, Inc.
1696 Massachusetts Avenue
Cambridge, MA 02138

COST 1. $29.95
2. $49.95 3. $79.95
4. $69.95 5. $24.95
6. $74.95 7. $69.95
8. $34.95 9. $34.95
10. $29.95 11. $29.95

TARGET GROUP Ages 10 to adult

COMPATABILITY Apple II(some may be available for other systems)

GENERAL DESCRIPTION OF EACH PROGRAM BY NUMBER

1. Program displays all major constellation in the northern hemisphere.

2. Displays horizontal and overhead views of the sky at any time of year for any location in the northern hemisphere.

3. Similar to Tell Star I but additional functions include tables for both hemisheres and tables for the Messier objects.

4. Plots the orbits of planets around the sun.

5. Demonstration of circular and orbital motion.

6. Four types of demonstrations are included: nature and evolution of stars; identification of spectral lines and their red shifts; evolution of the universe according to the various Big Bang models; and dynamic presentation of either geocentric or heliocentric orbits.

7. Simulation of a spaceship docking. It is designed to develop understanding of the relationship between displacement, speed, and acceleration in orbit.

8. Simulation of space flight in which the operator must achieve an orbit around the earth and dock in space station.

9. Simulation of a space flight from earth to Saturn by a NASA scientist.

10. Demo and noninteractive tutorial program relating to the solar system.

11. Tutorials in high resolution graphics on such topics as types of stars, origin and types of galaxies, practice on recognizing and naming constellations, visual binary stars, death of a star, Doppler effect, exploration of the universe's origins.

# CLASSROOM ACTIVITIES AND MODULES

ANALEMMA
(Classroom exercisess)

SOURCE ADDRESS Dorothy Stockton
1414 Floweree
Helena, MT 59601

COST $1.00 for postage

TARGET GROUP Ages 10 to 14

POTENTIAL USES
course component

GOAL Introduce students to the effects of a 23 1/2 degree tilt to the Earth's axis.

SPECIFIC OBJECTIVES
1. Create an Analemma (funny figure of 8 globes).
2. Observe and record facts about shadows.

NATURE OF ACTIVITIES/CONTENT A series (36) of short (1 minute) observations of the sun's shadow leading to students' plotting of an analemma.

GENERAL DESCRIPTION/UNIQUE CHARACTERISTICS Activity may be integrated with mathematics, social studies, language arts, or art.

COMPONENTS (instructor x student ___ )
9 pages on construction of analemma
bibliographical references

INSTRUCTIONAL FORMAT
printed material for developing a lab activity

TIME FOR INSTRUCTION
36 sessions of one minute

EVALUATION OF MATERIALS

| | |
|---|---|
| NUMBER OF TEST GROUPS | 8 |
| NUMBER OF SCHOOLS/INSTITUTIONS | 1 |
| TOTAL NUMBER OF STUDENTS INVOLVED | 50 |
| EVIDENCE OF EFFECTIVENESS | interest of students |

LOCAL REPRODUCTION LIMITATIONS Local reproduction privileges granted for educational uses.

ASTRONOMY REPORTS
(1 extended activity set)

SOURCE ADDRESS Thorston W. Hendrich
Cedar Hill Junior Secondary School
3910 Cedar Hill Road
Victoria, BC V8p 3Z9

COST $.60

TARGET GROUP Ages 10 to 14

POTENTIAL USES
course component

GOAL Provide students with active way in integrating text material and class activity.

SPECIFIC OBJECTIVES
1. Understand one aspect of astronomy in depth.
2. Share information through oral presentation.
3. Improve library skills.
4. Work cooperatively in a group.

NATURE OF ACTIVITIES/CONTENT Students work in groups to solve specific problems or investigate areas in astronomy.

GENERAL DESCRIPTION/UNIQUE CHARACTERISTICS A description of a procedure, evaluation and class management system to help students make astronomy reports while working in small groups.

COMPONENTS (instructor x student x )
A four page student handout describing how to make an astronomy report.
Components include:
1. Written report
2. Display
3. Presentation

INSTRUCTIONAL FORMAT
printed material

TIME FOR INSTRUCTION
open

EVALUATION OF MATERIALS

NUMBER OF TEST GROUPS ___
NUMBER OF SCHOOLS/INSTITUTIONS 1
TOTAL NUMBER OF STUDENTS INVOLVED ___
EVIDENCE OF EFFECTIVENESS

LOCAL REPRODUCTION LIMITATIONS Local reproduction privileges granted for educational uses.

CIRCUMPOLAR STARS STUDY
(Classroom activity)

SOURCE ADDRESS Jon Hafstrom
450 Redmond Road
Eureka, CA 95501

COST $0.50

TARGET GROUP Ages 9 to 12

POTENTIAL USES
classroom
outdoor education

GOAL Increase the students's knowledge of the circumpolar sky.

SPECIFIC OBJECTIVES
1. Identify names and outlines of five circumpolar constellations.
2. Describe how to find the North Star.
3. Identify three names for the North Star.
4. Find and draw three circumpolar constellations in a "night activity" lesson.

NATURE OF ACTIVITIES/CONTENT Through reading and discussion, students learn about the circumpolar constellations and their related stars.

GENERAL DESCRIPTION/UNIQUE CHARACTERISTICS A self-paced set of student worksheets for middle grade students.

COMPONENTS (instructor ___ student x )
6 page student guide
"What do you know about the Big Dipper?" reprint from Ranger Rick Nature Magazine is included.

INSTRUCTIONAL FORMAT
printed materials for self-paced lesson

TIME FOR INSTRUCTION
2 one-hour sessons

EVALUATION OF MATERIALS

| | |
|---|---|
| NUMBER OF TEST GROUPS | 2 |
| NUMBER OF SCHOOLS/INSTITUTIONS | 1 |
| TOTAL NUMBER OF STUDENTS INVOLVED | 50 |

EVIDENCE OF EFFECTIVENESS In the test groups, mastery of 75% or more of the lesson objectives was exhibited.

LOCAL REPRODUCTION LIMITATIONS For worksheets, local reproduction privileges granted for educational uses.

CONSTELLATIONS AND MYTHOLOGY
(Classroom activity)

SOURCE ADDRESS Douglas Weeks
EDUCOMP
5000 West Memorial Rd.
Oklahoma City, OK 73142

COST $5.00

TARGET GROUP Ages 15 to adult

POTENTIAL USES
unit component
planetarium followup
outdoor activity

GOALS Introduce students to the constellations and some of the mythology behind them.

SPECIFIC OBJECTIVES
1. Identify common constellations through direct observation and the use of various charts and handouts.
2. Become aware of the mythology of each constellation.
3. Create constellations and myths.

NATURE OF ACTIVITIES/CONTENT The activity is designed to be used first in the classroom and then on a field outing during the evening to observe the constellations in the night sky.

GENERAL DESCRIPTION/UNIQUE CHARACTERISTICS Students create models of the constellations which makes observation easier.

COMPONENTS (instructor x student x )
14 page teacher and student guide
hammer, nails, cans, paper, tape, and scissors are needed.

INSTRUCTIONAL FORMAT
printed material

TIME FOR INSTRUCTION
1 to 2 sessions

EVALUATION OF MATERIALS

| | |
|---|---|
| NUMBER OF TEST GROUPS | 40 |
| NUMBER OF SCHOOLS/INSTITUTIONS | 1 |
| TOTAL NUMBER OF STUDENTS INVOLVED | 800 |

EVIDENCE OF EFFECTIVENESS It has been used in connection with night hikes at the nature center. Retention of information is around 80%.

LOCAL REPRODUCTION LIMITATIONS Local reproduction privileges granted for educational uses.

GUIDELINES FOR ASTRONOMY COURSES
(Guide for organizing a course.)

SOURCE ADDRESS Astronomical League Book Service
1001 S. Cornelia Street
Sioux City, Iowa 51106

COST $4.50

TARGET GROUP Ages 12 to adult

POTENTIAL USES
course component
teacher education
community group

GOAL Provide planning information to those who are organizing and conducting a beginning course in astronomy.

SPECIFIC OBJECTIVES
1. Determine course objectives, selection of a text, and developing a lesson plan.
2. Establish fees and obtaining certification.
3. Improve lecturing techniques.

NATURE OF ACTIVITIES/CONTENT It is an aid to help amateur astronomy clubs plan courses for their members. However, it may be used as a guide by anyone witshing to organize and conduct a beginning basic course in astronomy.

GENERAL DESCRIPTION/UNIQUE CHARACTERISTICS The guide provides a complete lesson by lesson description of topics to be included in four different types of astronomy courses.

COMPONENTS (instructor _x_ student ___ )
67 page booklet

INSTRUCTIONAL FORMAT
printed material

TIME FOR INSTRUCTION
open

EVALUATION OF MATERIALS

| | |
|---|---|
| NUMBER OF TEST GROUPS | yes |
| NUMBER OF SCHOOLS/INSTITUTIONS | yes |
| TOTAL NUMBER OF STUDENTS INVOLVED | |
| EVIDENCE OF EFFECTIVENESS | |

LOCAL REPRODUCTION LIMITATIONS Request for reproduction should be addressed to the above address stating reason for reproduction.

KEPLER'S LAWS
(Classroom activity)

SOURCE ADDRESS
Ronald F. Reynolds
Barrington High School
Lincoln Avenue
Barrington, RI 02806

COST $2.50

TARGET GROUP Ages 14 to adult

POTENTIAL USES
classroom
unit component
large group
planetarium followup

GOAL Aid pupils to discover Kepler's Laws.

SPECIFIC OBJECTIVES
1. Develop a means for comparing areas of irregularly shaped objects.
2. Discover, by construction, Kepler's second law (equal areas) and recognize the sun as one of the focii in planetary orbits.
3. Use Bode's law to find the mean radius of planetary orbits.
4. Discover, by calculation, Kepler's third law (radius and time) and determine the value of the constant.
5. Apply Kepler's third law to calculate periods and radii.

NATURE OF ACTIVITIES/CONTENT A series of worksheets, charts, and diagrams is furnished to pupils who work individually at their own pace. By measuring diagrams and performing calculations they are to discover relationships. Teacher guidance and discussion should accompany the activity.

GENERAL DESCRIPTION/UNIQUE CHARACTERISTICS By using worksheets and diagrams student discover relationships between the motions of the earth and time. This activity is suitable for physics and high school earth science courses.

COMPONENTS (instructor x student x )
15 page teacher and student guide
simple materials are needed.
student evaluations and references included.

INSTRUCTIONAL FORMAT
printed material

TIME FOR INSTRUCTION
4 or 5 sessions

EVALUATION OF MATERIALS

| | |
|---|---|
| NUMBER OF TEST GROUPS | 2 |
| NUMBER OF SCHOOLS/INSTITUTIONS | 1 |
| TOTAL NUMBER OF STUDENTS INVOLVED | 45 |

EVIDENCE OF EFFECTIVENESS Positive feedbacks from pupils and students' success on exams.

LOCAL REPRODUCTION LIMITATIONS Local reproduction privileges granted for educational uses.

MODELING STOCHASTIC SELF-PROPAGATING STAR FORMATION (SSPSF)
(Classroom activity)

SOURCE ADDRESS
Jeanne E. Bishop
Westlake School
24525 Hilliard Rd
Westlake, OH 44145

COST $.40 +
Self-addressed
Stamped envelope

TARGET GROUP Age 15 to adult

POTENTIAL USES
classroom
small group
unit component
planetarium followup

GOAL Acquaint students with random behavior postulated by SSPSF theory.

SPECIFIC OBJECTIVES
1. Observe the predictive effects theory of star formation.
2. Construct a model representing a theory of star formation.
3. Understand certain limitations of a theory of star formation.

NATURE OF ACTIVITIES/CONTENT A graphing activity with instructions for interpretation. Definitions and recommended readings are included.

GENERAL DESCRIPTION/UNIQUE CHARACTERISTICS Concrete way to experience abstract ideas.

COMPONENTS (instructor x student x )
4 page teacher/student guides
coins, toothpicks, graph paper,
and dice are needed.

INSTRUCTIONAL FORMAT
printed materials

TIME FOR INSTRUCTION
1 session

EVALUATION OF MATERIALS

| | |
|---|---|
| NUMBER OF TEST GROUPS | 3 |
| NUMBER OF SCHOOLS/INSTITUTIONS | 4 |
| TOTAL NUMBER OF STUDENTS INVOLVED | 40 |

EVIDENCE OF EFFECTIVENESS Shared as a presentation at 3 conferences. Others have tried it effectively.

LOCAL REPRODUCTION LIMITATIONS Local reproduction privileges granted for edcuational uses.

THE MOONWATCHERS
(Classroom resource)

SOURCE ADDRESS International Programs
Education Development Center
55 Chapell Street
Newton, MA 02160

COST $9.10+
$.50 postage

TARGET GROUP Ages 5 to 14

POTENTIAL USES
classroom
workshop
teacher education
self-instruction

GOAL Become acquainted with the phases of the moon in the context of West African cultural lore.

SPECIFIC OBJECTIVES
1. Understand the moon and its motion.
2. Provide techniques for observing the moon.

NATURE OF ACTIVITIES/CONTENT It is a story about a boy and his grandfather who watch the moon from their village near the banks of river Niger. It contains ideas and activities for "tracking the moon."

GENERAL DESCRIPTION/UNIQUE CHARACTERISTICS The booklet is an attractive narrative with drawings. It was designed for African school, but can provide other children with an appreciation of another culture. The side margins illustrate the moon's position at different times during the evening and month. A good resource to integrate science and social studies in a unit on Africa.

COMPONENTS (instructor x student x )
65 page booklet

INSTRUCTIONAL FORMAT
printed materials

TIME FOR INSTRUCTION
open

EVALUATION OF MATERIALS

NUMBER OF TEST GROUPS ____
NUMBER OF SCHOOLS/INSTITUTIONS many
TOTAL NUMBER OF STUDENTS INVOLVED many
EVIDENCE OF EFFECTIVENESS Field tested with African children and was described as effective.

LOCAL REPRODUCTION LIMITATIONS Local reproduction privileges granted for educational uses.

MY EXTRA-TERRESTRIAL
(Writing/art activity)

SOURCE ADDRESS
James T. Siscel
Echo Lake Elementary School
19345 Wallingford Avenue, N.
Seattle, WA 98133

COST Self-adressed stamped envelope

TARGET GROUP Ages 10 to 14

POTENTIAL USES
classroom
large group
unit component

GOALS Make students aware of different types of habitats which might exist in different planetary systems. Students determine different physical characteristics necessary to live in these habitats.

SPECIFIC OBJECTIVES
1. Draw an extra-terrestrial and the planet it inhabits.
2. Write a description of the extra-terrestrial and planet habitat.

NATURE OF ACTIVITIES/CONTENT It is an art and writing activity.

GENERAL DESCRIPTION/UNIQUE CHARACTERISTICS

COMPONENTS (instructor x student ___ )
one page teacher guide
art and writing materals required.

INSTRUCTIONAL FORMAT
printed material

TIME FOR INSTRUCTION
2 or 3 45-minute sessions

EVALUATION OF MATERIALS

| | |
|---|---|
| NUMBER OF TEST GROUPS | 5 |
| NUMBER OF SCHOOLS/INSTITUTIONS | 1 |
| TOTAL NUMBER OF STUDENTS INVOLVED | 170 |
| EVIDENCE OF EFFECTIVENESS | |

LOCAL REPRODUCTION LIMITATIONS Local reproduction privileges granted for educational uses.

ORIGIN OF CONSTELLATIONS
(Classroom lesson)

SOURCE ADDRESS Darrel Hoff
Astronomy Coordinator
Universtiy of Northern Iowa
Cedar Falls, IA 50614

COST None

TARGET GROUP Ages 10 to adult

POTENTIAL USES
course component
teacher education

GOAL Develop the concept of constellations using inquiry approach.

SPECIFIC OBJECTIVES
1. Identify constellations.
2. Develop criteria for evaluating origins based on names.
3. Infer cultural conditions based on constellation names.

NATURE OF ACTIVITIES/CONTENT After students become involved with some background information and a list of constellations as known to Ptolemy, the students are organized to develop ideas as to the origins of the star groups.

GENERAL DESCRIPTION/UNIQUE CHARACTERISTICS An open ended investigation involving the processes of science and encouragment of student creativity.

COMPONENTS (instructor x student x )
6 page instructor's guide
bibliographical references
student list of constellations

INSTRUCTIONAL FORMAT
printed materials

TIME FOR INSTRUCTION
one session, open

EVALUATION OF MATERIALS

| | |
|---|---|
| NUMBER OF TEST GROUPS | many |
| NUMBER OF SCHOOLS/INSTITUTIONS | many |
| TOTAL NUMBER OF STUDENTS INVOLVED | many |
| EVIDENCE OF EFFECTIVENESS | participant subjective reactions |

LOCAL REPRODUCTION LIMITATIONS Local reproduction privileges granted for educational uses.

PARALLAX
(Classroom lesson)

SOURCE ADDRESS William F. Miller
IMC
Goshen College
Goshen, IN 46526

COST $25.00/set of slides and cassette tape

TARGET GROUP Ages 15 to adult

POTENTIAL USES
course component
self-instruction
large groups

GOAL Introduce the concept of parallax.

SPECIFIC OBJECTIVES
1. Introduce the concept of parallax.
2. Describe how the concept of parallax is important to astronomy.
3. Describe the history of the parallax concept.

NATURE OF ACTIVITIES/CONTENT Activities include a teacher guided demonstration of the parallax concept.

GENERAL DESCRIPTION/UNIQUE CHARACTERISTICS Students are introduced to parallax through coordinated slides with a narrated cassette tape.

COMPONENTS (instructor x student x )
Materials include 40 slides and a cassete tape. Requires cassette tape recorder and slide projector for use

INSTRUCTIONAL FORMAT
slide, cassette tape presentation

TIME FOR INSTRUCTION
one ten-minute session plus time for discussion

EVALUATION OF MATERIALS

| | |
|---|---|
| NUMBER OF TEST GROUPS | 6 |
| NUMBER OF SCHOOLS/INSTITUTIONS | 1 |
| TOTAL NUMBER OF STUDENTS INVOLVED | 100 |

EVIDENCE OF EFFECTIVENESS It was well received by students who have found it helpful in understanding the concept of stellar parallax.

LOCAL REPRODUCTION LIMITATIONS Reproduction privileges not granted.

RETROGRADE MOTION
(1 OR 2 activity set)

SOURCE ADDRESS
Lora Wilhite
Carlinville High School
Carlinville, IL 62626

COST $1.50

TARGET GROUP Ages: 14 to adult

POTENTIAL USES
course component
large group
classroom

GOAL Illustrate retrograde motion in addition to sideral and synodic periods and overtake time.

SPECIFIC OBJECTIVES
1. Observe relative motion and retrograde motion of inner and outer planets in a simulation.
2. Model planetary motions to determine the cause of retrograde motion.
3. Perform calculations of Kepler's Ratio involving time and distance.

NATURE OF ACTIVITIES/CONTENT In a group session students walk through and observe analogies of various types of planetary motion. Students then perform sample calculations of Kepler's Ratio.

GENERAL DESCRIPTION/UNIQUE CHARACTERISTICS Involving adolescents and adults in teaching a concept.

COMPONENTS (instructor x student ___ )
10 page instructors guide

INSTRUCTIONAL FORMAT
printed material

TIME FOR INSTRUCTION
one to two hour session

EVALUATION OF MATERIALS

| | |
|---|---|
| NUMBER OF TEST GROUPS | 3 |
| NUMBER OF SCHOOLS/INSTITUTIONS | 2 |
| TOTAL NUMBER OF STUDENTS INVOLVED | 100 |

EVIDENCE OF EFFECTIVENESS Used for physcis teacher workshop also used with students in classroom.

LOCAL REPRODUCTION LIMITATIONS Local reproduction privileges granted for educational uses.

SCALE MODEL SOLAR SYSTEM
(Classroom activity)

SOURCE ADDRESS Leilani Clark
1200 E. Rundburg
Austin, TX 78753

COST free

TARGET GROUP Grades 4 to 8

POTENTIAL USES
course component
teacher education

GOAL Understand the vast distances between the sun and planets and to reinforce the use of the metric system.

SPECIFIC OBJECTIVES
1. Construct a model of the solar system on adding machine tape showing a scale of planetary distances.
2. Use metric measurement in constructing models.

NATURE OF ACTIVITIES/CONTENT Students individually or in small groups draw and cut out the planets and their characteristics. The planets are then put on adding machine tape to represent their distance from the sun.

GENERAL DESCRIPTION/UNIQUE CHARACTERISTICS Provides a manageable process and a permanent record for building a scale model of the solar system.

COMPONENTS (instructor x student ___ )
instructor information

INSTRUCTIONAL FORMAT
printed material

TIME FOR INSTRUCTION
1 session, 1 hr. in length

EVALUATION OF MATERIALS

NUMBER OF TEST GROUPS 6+
NUMBER OF SCHOOLS/INSTITUTIONS ___
TOTAL NUMBER OF STUDENTS INVOLVED 150+

EVIDENCE OF EFFECTIVENESS This activity is very popular with children in elementary grades. This is shown by the enthusiam and quality of work exhibited by the students.

LOCAL REPRODUCTION LIMITATIONS Contact source regarding reproduction.

SEASONAL RELATIONS OF THE EARTH
(Classroom activity)

SOURCE ADDRESS Ronald F. Reynolds
Barrington High School
Lincoln Ave.
Barrington, RI 02806

COST $1.25

TARGET GROUP Ages 12 to adult

POTENTIAL USES
classroom
unit component
large group
planetarium followup

GOAL Understand the cause of the seasons, variation of the length of daylight, and variations of temperature on the earth.

SPECIFIC OBJECTIVES
1. Understand relationship between earth seasons, shape of the earth's orbit, and tilt of the earth's axis.
2. Gain a more concrete understanding of terms such as the equator, earth circles, and tropics.
3. Awareness of the relative lengths of day and night for various latitudes and seasons.
4. Distinguish between the causes of day and night and the seasons.

NATURE OF ACTIVITIES/CONTENT By using worksheets and diagrams, students will discover relationships between motions of the earth and its effects on the earth. Teacher guidance and discussion should take place during the activity.

GENERAL DESCRIPTION/UNIQUE CHARACTERISTICS

COMPONENTS (instructor x student x )
7 page teacher and student guide
rulers needed
student test included

INSTRUCTIONAL FORMAT
printed material

TIME FOR INSTRUCTION
1 or 2 sessions

EVALUATION OF MATERIALS

NUMBER OF TEST GROUPS 2
NUMBER OF SCHOOLS/INSTITUTIONS 1
TOTAL NUMBER OF STUDENTS INVOLVED 45
EVIDENCE OF EFFECTIVENESS Positive feedback from pupils and good test results.

LOCAL REPRODUCTION LIMITATIONS Local reproduction privileges granted for educational uses.

SIZE OF THE OBSERVABLE UNIVERSE
(Classroom lesson)

SOURCE ADDRESS Thomas J. Sarko
Palm Beach Day School
241 Seaview Avenue
Palm Beach, FL 33480

COST $.40

TARGET GROUPS Ages 10 to adult

POTENTIAL USES
course component

GOALS Understand the relative differences between astronomical objects and the overall size of the universe.

SPECIFIC OBJECTIVES
1. Compare the distance of fundamental objects in the universe to a scale starting in your classroom.
2. List types of basic objects found in the universe.

NATURE OF ACTIVITIES-CONTENT Students each receive a copy of the chart "Observable Objects In Our Galaxy and Beyond." Teacher-student discussions and plotting of objects deal with how objects were selected, comparisons of distance used and amplification of the scale model itself.

GENERAL DESCRIPTION-UNIQUE CHARACTERISTICS The technique of plotting the size of the universe is shown through an example starting in Palm Beach, FL.

COMPONENTS (instructor x student ___ )

1 sheet with instructions and data chart

INSTRUCTIONAL FORMAT
data sheet for
student activity

TIME FOR INSTRUCTION
one hour session

EVALUATION OF MATERIALS
Number of field test groups ___
Number of schools/institutions 3
Total number of students involved 500
Evidence of effectiveness: personal observation of student response

LOCAL REPRODUCTION LIMITATIONS Local reproduction privileges granted for educational uses.

THE SKY IN AFRICA

1. STARS OVER AFRICA
2. STRANGERS IN THE SKY
3. USING THE SKy (Classroom resource)
4. HOW THE SKY LOOKS

SOURCE ADDRESS International Programs
Education Development Center
55 Chapell Street
Newton, MA 02160

COST 1. $4.20
2. $5.40
3. $3.65
4. $3.10
Each book + $.50 postage

TARGET GROUP Ages 5 to adult

POTENTIAL USES
classroom
workshop
field
teacher education
self-instruction

GOAL Introduce students to celestial coordinates using the African sky.

SPECIFIC OBJECTIVES

1. Determine what group of stars can be found at any one time during the year, name of the common stars, and describe some African stories about them.
2. Determine the position of the planets during the year using four big group of stars.
3. Tell the time of night, the season, and how to keep from getting lost when you travel at night by using the movement of stars across the sky.
4. Describe the sky in different times of night and times of the year by using a series of charts which show the stars in the African sky.

NATURE OF ACTIVITIES/CONTENT A series of four books describe by text and charts the sky in Africa. They describe the stars, planets, and the sky in the African context.

GENERAL DESCRIPTION/UNIQUE CHARACTERISTICS While designed for African schools, the series gives the northern hemisphere teacher an opportunity to illustrate the view of the sky in the southern hemisphere to her students in a different cultural context. A good set of materials to integrate science and social studies in a unit on Africa.

COMPONENTS (instructor x student x )
series of four books.

INSTRUCTIONAL FORMAT
printed materials

TIME FOR INSTRUCTION
open

EVALUATION OF MATERIALS

NUMBER OF TEST GROUPS ____
NUMBER OF SCHOOLS/INSTITUTIONS many
TOTAL NUMBER OF STUDENTS INVOLVED many
EVIDENCE OF EFFECTIVENESS Field tested with African children and were described as effective.

LOCAL REPRODUCTION LIMITATIONS Local reproduction privileges granted for educational use.

SOLAR SYSTEM READING
(Reading challenge activity)

SOURCE ADDRESS James T. Siscel
Echo Lake Elementary School
19345 Wallingford Avenue, N.
Seattle, WA 98133

COST $2

TARGET GROUP Ages 7 to 14

POTENTIAL USES
classroom
unit component
large group

GOAL Introduce students to the relative size and position of planets in solar system, give students information about planets in solar system, and encourage reading of fiction books.

SPECIFIC OBJECTIVES
1. Construct solar system model.
2. Learn facts about the solar system.
3. Students motivate themselves to read books.

NATURE OF ACTIVITIES/CONTENT Using tagboard scale models of planets placed in relative positions on a classroom bulletin board, the teacher introduces the basic information about size and positon of the planets in the solar system. As students read books their index card space shuttles are moved from one planet to the next. The number of books required to move from one planet to the next is based on the distance between the planets. Upon reaching a planet, the student receives a certificate giving information about the planet.

GENERAL DESCRIPTION/UNIQUE CHARACTERISTICS Motivational program for reading using astronomy information.

COMPONENTS (instructor x student x )
2 page teacher guide
student feedback certificates
student progress record

INSTRUCTIONAL FORMAT
printed material

TIME FOR INSTRUCTION
open

EVALUATION OF MATERIALS

| | |
|---|---|
| NUMBER OF TEST GROUPS | 4 |
| NUMBER OF SCHOOLS/INSTITUTIONS | 1 |
| TOTAL NUMBER OF STUDENTS INVOLVED | 140 |
| EVIDENCE OF EFFECTIVENESS | |

LOCAL REPRODUCTION LIMITATIONS Local reproduction privileges granted for educational uses.

STAR COUNTING IN THE PLANETARIUM
(Classroom activity)

SOURCE ADDRESS Joseph Fox
Chichester Junior High School
925 Meetinghouse Rd.
Boothwyn, PA 19061

COST Self-addressed envelope + 2 stamps

TARGET GROUP Ages 15 to adult

POTENTIAL USES
course component

GOAL Approximate accurately the number of stars visible in the planetarium.

SPECIFIC OBJECTIVES
1. Observe stars in the planetarium using cardboard tubes.
2. Follow step-by-step calculations to arrive at an answer.

NATURE OF ACTIVITIES/CONTENT The activity demonstrates random sampling techniques by using visible stars as subjects.

GENERAL DESCRIPTION/UNIQUE CHARACTERISTICS The activities involve advanced mathematics and may require calculators to save class instruction time.

COMPONENTS (instructor x student x )
5 page worksheet and instructions
planetarium recommended

INSTRUCTIONAL FORMAT
printed material

TIME FOR INSTRUCTION
2 45-minute session

EVALUATION OF MATERIALS

NUMBER OF TEST GROUPS 2
NUMBER OF SCHOOLS/INSTITUTIONS 1
TOTAL NUMBER OF STUDENTS INVOLVED 60
EVIDENCE OF EFFECTIVENESS Students completed a quiz with 85% competency after use.

LOCAL REPRODUCTION LIMITATIONS Local reproduction privileges granted for educational use.

THE SUN'S YEARLY CYCLE
(Classroom activity)

SOURCE ADDRESS Joseph Fox
Chichester Junior High School
925 Meetinghouse Rd.
Boothwyn, PA 19061

COST Self-addressed envelope + 2 stamps

TARGET GROUP Ages 10 to adult

POTENTIAL USES
course component

GOAL Provide students with a demonstration and accurate record of the sun's rising and setting points and path across the daytime sky on the solstices and equinoxes.

SPECIFIC OBJECTIVES
1. Demonstrate rising and setting points and path across daytime sky of the sun on solstices and equinoxes.
2. Identify specific points on celestial sphere diagrams.

NATURE OF ACTIVITIES/CONTENT The activities include planetarium demonstrations and student worksheets to accompany the show.

GENERAL DESCRIPTION/UNIQUE CHARACTERISTICS It provides the student with information to encourage observation outside the classroom.

COMPONENTS (instructor x student x )
5 page worksheet and instructions
transparency needed

INSTRUCTIONAL FORMAT
printed material

TIME FOR INSTRUCTION
1 45-minute session

EVALUATION OF MATERIALS

| | |
|---|---|
| NUMBER OF TEST GROUPS | 12 |
| NUMBER OF SCHOOLS/INSTITUTIONS | 1 |
| TOTAL NUMBER OF STUDENTS INVOLVED | 330 |

EVIDENCE OF EFFECTIVENESS Students completed a quiz with 80% competency after use.

LOCAL REPRODUCTION LIMITATIONS Local reproduction privileges granted for educational use.

USING OBSERVATIONAL ASTRONOMY AS A VEHICLE TO TEACH SCIENCE TO NON-READERS
(Set of classroom lessons)

SOURCE ADDRESS Russ Harding
187 Noroton Ave.
Darien, CT 06826

COST $10.00

TARGET GROUP Ages 5 to 14

POTENTIAL USES
outdoor activity
unit component

GOAL Motivate students to observe the sky.

SPECIFIC OBJECTIVES
1. Understand directions for observing the moon, sun, planets, and constellations.
2. Observe and record observations of the moon, sun, planets, and constellations.
3. Determine the sun's motion through shadows.
4. Predict motion of objects in the sky over time.

NATURE OF ACTIVITIES/CONTENT The students use 'REMINDERS', notes on what to observe in today's sky, to observe and record sky objects and events. Other activities include drawing shadows and charting motions of sky objects.

GENERAL DESCRIPTION/UNIQUE CHARACTERISTICS The materials represent a trial edition. Reading is not a prerequisite to these activities. Children with dyslexia have been successful with these materials.

COMPONENTS (instructor x student ___ )
teacher's guide

INSTRUCTIONAL FORMAT
printed materials

TIME FOR INSTRUCTION
20 to 25 15-minute sessions

EVALUATION OF MATERIALS

| | |
|---|---|
| NUMBER OF TEST GROUPS | 1 |
| NUMBER OF SCHOOLS/INSTITUTIONS | 1 |
| TOTAL NUMBER OF STUDENTS INVOLVED | |
| EVIDENCE OF EFFECTIVENESS | Success with non-readers |

LOCAL REPRODUCTION LIMITATIONS Local reproducation privileges granted for educational uses.

# LABORATORY LESSONS AND MODULES

THE ANALEMMA
(Laboratory exercises)

SOURCE ADDRESS
Robert Allen
Physics Department-Cowley Hall
University of Wisconsin
La Crosse, WI 54601

COST $.45

POTENTIAL USES
lab exercise in astronomy, math, science, social studies, language arts, and art

TARGET GROUPS Ages 15 to adult

GOAL Understand how mean and apparent time are related and how the analemma can be used to determine the noon altitude of the sun and when the sun is due south.

SPECIFIC OBJECTIVES
1. Identify and describe the two axes of the analemma.
2. Use the analemma to determine the altitude of the sun at local apparent noon at various latitudes on earth.
3. Use the analemma to determine the observer's standard time on any day of the year when the sun is due south at its highest altitude.

NATURE OF ACTIVITIES-CONTENT Students learn how to read the analemma and how to use it to determine the noon altitude of the sun at various latitudes. The apparent and mean time relationship is explained.

GENERAL DESCRIPTION-UNIQUE CHARACTERISTICS A lab exercise that can be used in a variety of courses from science to art.

COMPONENTS (instructor x student ___ )
Instruction on use and construct an analemma.
No evaluation material included.

INSTRUCTIONAL FORMAT
printed material

TIME FOR INSTRUCTION
about 2 1-hr. sessions

EVALUATION OF MATERIALS
Number of field test groups ___
Number of schools/institutions ___
Total number of students involved ___
Evidence of effectiveness Has been used several years in a college introductory astronomy course.

LOCAL REPRODUCTION LIMITATIONS Local reproduction privileges granted for educational uses.

APPARENT MOVEMENT OF CELESTIAL OBJECTS
(4 lab activities)

SOURCE ADDRESS V.E. Rygaard
207 Sunset
Lee's Summit, MO 64063

COST $.75
for postage

TARGET GROUPS Ages 10 to 14

POTENTIAL USES
self-instruction
unit project
course component

GOAL Describe the apparent movement of the stars, planets, or moon.

SPECIFIC OBJECTIVES
1. Construct and use an astrolabe.
2. Describe the apparent movement of the stars and planets from hour to hour and from night to night.
3. Determine the movement of the moon from night to night.
4. Photograph and interpret star trails.
5. Photograph and interpret the motion of the moon through measurement.

NATURE OF ACTIVITIES-CONTENT Students observe the apparent movement of celestial objects by time-lapse photography. They record observations of celestial coordinates using simple astrolab.

GENERAL DESCRIPTION-UNIQUE CHARACTERISTICS Four short, fun activities for observation of celestial objects.

COMPONENTS (instructor ___ student x )
Includes student materials and data charts for observation of night sky, 7 pages.
1. apparent movement of stars or planets
2. the moon's movement
3. making and using quadrant
4. photographing celestial objects - the moon
5. photographing celestial objects - star trails

INSTRUCTIONAL FORMAT
printed materials

TIME FOR INSTRUCTION
5 lessons - 1 to 2 hours each, can be open ended

EVALUATION OF MATERIALS
Number of field test groups 3
Number of schools/institutions 1
Total number of students involved 200
Evidence of effectiveness Student enthusiasm high. Comments from parents and administrators very favorable.

LOCAL REPRODUCTION LIMITATIONS Local reproduction priviledges granted for educational uses.

CONSTRUCTION AND USE OF A MODEL OF NEARBY SPACE
(3 extended laboratory exercises)

SOURCE ADDRESS West Virginia University Bookstore
College Avenue
Morgantown, WV 26506

COST $7.00
$1.75 shipping and handling
for multi-copy discounts contact developer

DEVELOPER Dennis W. Sunal
Division of Education
604 Allen Hall
West Virginia University
Morgantown, WV 26506-6122

TARGET GROUP Ages 15 to adult

POTENTIAL USES
course component
workshop
self-instruction
teacher education
lab component

GOAL Determine the organization and location of objects in nearby space-earth, planet, sun, local group of stars, local part of our galaxy.

SPECIFIC OBJECTIVES
1. Describe the relationship of observations to our view of the universe.
2. Describe and accurately perform measurement of the altitude and angular separation of two objects.
3. Accurately record and identify the major features of the current night sky.
4. Describe, perform, and record measurements which indicate the angular distance from the sun to all visible planets and to sample constellations in the current night sky.
5. Describe the procedure and locate constellations, planets, and the sun on star charts using previous measurments from the current night sky.
6. Interpret and plot sky observations of the planets as related on scale drawing of their orbits..
7. Describe the process and construct a 3D model of the solar system and nearby space for a specific night observation.
8. Interpret relationships and solve simple problems involving
   a) location, direction, shape, distance, time, and movement within the solar system and the nearby stars;
   b) astronomical concepts and definitions as viewed from earth and other locations in and out of the solar system.

NATURE OF ACTIVITIES/CONTENT Use information from direct night sky observations to construct 3D models of nearby space. Activities include observation, drawing, recording, measuring, calculating, defining, plotting, constructing, interpreting data, and solving problems.

GENERAL DESCRIPTION/UNIQUE CHARACTERISTICS Self-paced worksheets, planetarium sessions, lab activities, and night observations can be mixed and integrated during the activity set. If data is provided to students on the positions of the planets on one day, planetarium and observing session are not required.

COMPONENTS (instructor x student x )

instructor material is provided along with student data recording sheets, about 100 pages total.
contents includes Observing from inside-outward; Observing and inferring from outside-inward; Model of nearby space visible to the naked eye.
readings extending lab concepts into historical ideas
model star map included
student developed glossary
planetarium lesson outlines (4 sessions), optional.
objectives
film: How vast is Space (in 10 steps), optional.

INSTRUCTIONAL FORMAT

printed material

TIME FOR INSTRUCTION

5 sessions approximately 2 hours each (optional) planetarium (2-4 sessions or 1-2 outside observation sessions)

EVALUATION OF MATERIALS

| | |
|---|---|
| NUMBER OF TEST GROUPS | 7 |
| NUMBER OF SCHOOLS/INSTITUTIONS | 1 |
| TOTAL NUMBER OF STUDENTS INVOLVED | 165 |

EVIDENCE OF EFFECTIVENESS Evidence of effectiveness; research study in progress.

LOCAL REPRODUCTION LIMITATIONS Local reproduction privileges granted subject to written approval and acknowledgement of the developer.

FIELD ASTRONOMY ACTIVITIES FOR MIDDLE SCHOOL
(4 lab activities)

SOURCE ADDRESS West Virginia University Bookstore
College Avenue
Morgantown, WV 26506

COST $2.00 + $1.00 shipping and handling for multiple copy shipping discounts, contact developer

DEVELOPER Dennis W. Sunal
Department of Curriculum & Instruction
604 Allen Hall
West Virginia University
Morgantown, WV 26506-6122

POTENTIAL USES
workshop material
course component
follow-up for planetarium
lab exercise
teacher education

TARGET GROUPS Ages 10 to 14
or introductory high school activity

GOAL Provide observation activities for middle school students.

SPECIFIC OBJECTIVES
1. Observe and record the effects of diurnal motion.
2. Observe and record telescopic observations.
3. Observe and record stars and constellations in the current sky.
4. Construct a view of our solar system from measurements made in the evening sky.

NATURE OF ACTIVITIES/CONTENT The activities include describing observed effects of the motion of the earth, identification of celestial objects, recording and interpreting planet positions, and charting the moon. Follow up discussion should occur during session or at a later time.

GENERAL DESCRIPTION-UNIQUE CHARACTERISTICS A guide to provide students with activities for their first night observing sessions. Procedures for setting up stations and planning activities are provided.

COMPONENTS (instructor x student x )
Teachers guide with student worksheets
Twelve student worksheets include:
1. Spaceship Earth and Moon
2. What in the Universe is That?
3. Constructing a Road Map - What Star Colony Do You Live In?
4. A View of Space From Our Earthship - Limited Edition

materials-small telescopes and binoculars needed with one activity
simple star and moon maps

INSTRUCTIONAL FORMAT
printed material
for setting up evening observation sessions

EVALUATION OF MATERIALS

| | |
|---|---|
| Number of field test groups | 22 |
| Number of schools/institutions | 12 |
| Total number of students involved | 1000 |

Evidence of effectiveness: 1) increased student interest, 2) use of experiences in class discussion reported as effective for increasing achievement

LOCAL REPRODUCTION LIMITATIONS Local reproduction privileges granted subject to written approval and acknowledgement of developer.

A GUIDE TO THE PHASES OF THE MOON
(Laboratory exercises)

SOURCE ADDRESS
Jenny Pon
Abrams Planetarium
Michigan State University
East Lansing, MI 48824

COST $1.50 cash or check only

POTENTIAL USES
teacher education
course component
large group
self-instruction

TARGET GROUPS Ages 10 to adult

GOAL Develop an awareness of where the moon is at any time of the day.

SPECIFIC OBJECTIVES
1. Demonstrate knowledge of basic concepts of lunar phases in diagrams and short answer questions.
2. Identify moon phases.
3. Predict lunar events and verify responses.
4. Observe and record the positions of the moon.

NATURE OF ACTIVITIES-CONTENT Numerous (and clear) illustrations with concise statements are used to help students answer questions, perform diagram-sketching activities and make outside observations.

GENERAL DESCRIPTION-UNIQUE CHARACTERISTICS Concepts are learned through illustrations, concise statements, diagrams and diagram-sketching activity, and recording data on sheets.

COMPONENTS (instructor ___ student x )
27 page student guide
evaluation materials
bibliographical references
additional materials: celestial globes and planetarium can be used to supplement study guide

INSTRUCTIONAL FORMAT
printed material

TIME FOR INSTRUCTION
2 hours

EVALUATION OF MATERIALS
Number of field test groups 2
Number of schools/institutions 1
Total number of student involved 200
Evidence of effectiveness: Feedback - indicates the many illustrations help clarify the concepts presented.

LOCAL REPRODUCTION LIMITATIONS Local reproduction priviledges granted for educational purposes.

HANDBOOK FOR THE WHITE LIGHT OBSERVATION OF SOLAR PHENOMENA
(Laboratory guide)

SOURCE ADDRESS Richard E. Hill, Recorder
A.L.P.O. Solar Section
4632 E. 14th Street
Tucson, AZ 85711

COST $4.00

POTENTIAL USES
self-instruction
course component
lab component

TARGET GROUP Ages 15 to adult

GOAL Familiarize the uninitiated with basic solar nomenclature, features, and observational techniques.

SPECIFIC OBJECTIVES
1. Understand general and specific solar phenomena including sunspots, classification, rotation, faculae, and flares.
2. Understand basic guidelines for making solar drawings, photographs(whole disk and high resolution), and heliocentric coordinates.
3. Understand basic requirements of reporting useful information.

NATURE OF ACTIVITIES/CONTENT The Handbook constists of 25 pages of descriptive material followed by the observing forms so that the reader may copy these and begin regular observations of the sun. These forms are part of the coordinated Association of Lunar and Planetary Observers Solar Section observing program.

GENERAL DESCRIPTION/UNIQUE CHARACTERISTICS It contains excellent sample records, blank solar drawings, and report forms.

COMPONENTS (instructor x student x )
25 page guide
Telescope and other assessories are needed.

INSTRUCTIONAL FORMAT
printed material

TIME FOR INSTRUCTION
open

EVALUATION OF MATERIALS

NUMBER OF TEST GROUPS ____
NUMBER OF SCHOOLS/INSTITUTIONS ____
TOTAL NUMBER OF STUDENTS INVOLVED ____
EVIDENCE OF EFFECTIVENESS Used by 75 observes in more than 12 countries.

LOCAL REPRODUCTION LIMITATIONS Local reproductions privileges are granted for the record and report forms only.

INVESTIGATING THE MOON'S ORBIT
(1 extended lab activity)

SOURCE ADDRESS
Larry Dunlap
Flandrau Planetarium
University of Arizona
Tuscon, Arizona 85721

COST $1.00

POTENTIAL USES
course component
Physics
Astronomy

TARGET GROUPS Ages 15 to adult

GOAL Introduce students to orbital elements using the moon as an example.

SPECIFIC OBJECTIVES
1. Observe and record measurements of the shape and orientation of the moon's orbit.
2. Compute orbital elements:
   a. inclination of plane
   b. longitude of descending mode
   c. average earth-moon distance
   d. longitude of perigee
   e. perigee and apogee distance
   f. moon's sidereal period

NATURE OF ACTIVITIES-CONTENT Students observe the position of the moon at 2 day intervals for 30 days to determine the shape and orientation of the moon's orbit.

GENERAL DESCRIPTION-UNIQUE CHARACTERISTICS This is a Planetarium laboratory activity that investigates the properties of the moon's orbit using a series of naked-eye observations, elementary mathematics, and astronomy concepts.

COMPONENTS (instructor x student x )

lab sheets for students included with teacher's guide
planetarium (needed)

INSTRUCTIONAL FORMAT
printed material
planetarium activity

TIME FOR INSTRUCTION
4-5 one-hour lessons

EVALUATION OF MATERIALS

| | |
|---|---|
| Number of field test groups | 2 |
| Number of schools/institutions | 2 |
| Total number of students involved | 20 |
| Evidence of effectiveness | |

LOCAL REPRODUCTION LIMITATIONS Contact author regarding reproduction.

LIGHT-"ADVENTURES ALONG THE SPECTRUM"
(3-6 Laboratory activities)

SOURCE ADDRESS Glenn Taylor
Hansen Planetarium
15 South State Street
Salt Lake City, Utah 84111

COST $4.00

TARGET GROUP Ages 10 to 14

POTENTIAL USES
course component
teacher education

GOAL Provide an understanding of what light is, how light is used in everyday situations, and how it is used by astronomers.

SPECIFIC OBJECTIVES
1. Construct and use a simple spectrograph.
2. Observe effects of light through prisms.

NATURE OF ACTIVITIES/CONTENT Lesson plans and aids are given to help students perform the construction of a spectrograph.

GENERAL DESCRIPTION/UNIQUE CHARACTERISTICS A brief teachers guide to supplement a unit on astronomy.

COMPONENTS (instructor x student ___ )
15 page teacher's guide
with the following sections:
vocabulary, important concepts,
energy spectrum diagram,
resource materials, and bibliography

INSTRUCTIONAL FORMAT
printed material

TIME FOR INSTRUCTION
3 20-minute sessions

EVALUATION OF MATERIALS

NUMBER OF TEST GROUPS ___
NUMBER OF SCHOOLS/INSTITUTIONS ___
TOTAL NUMBER OF STUDENTS INVOLVED 40
EVIDENCE OF EFFECTIVENESS Teachers express effectiveness with use.

LOCAL REPRODUCTION LIMITATIONS Local reproduction privileges granted for educational use.

LUNA INCOGNITA OBSERVING KIT
(Laboratory projects)

SOURCE ADDRESS John E. Westfall
Department of Geography
San Francisco State University
1600 Holloway Avenue
San Francisco, CA 94132

COST $1.50

TARGET GROUP Observational project intended for trained observers

POTENTIAL USES
laboratory project
astronomy club

GOAL Map previously unmapped areas of the moon.

SPECIFIC OBJECTIVES
1. Observe and record lunar features in the area of Luna Incognita.
2. Establish laison with fellow observers.

NATURE OF ACTIVITIES/CONTENT Observational records are made on 11 standardized charts. Instructors and drawing outline forms are provided to aid the observer.

GENERAL DESCRIPTION/UNIQUE CHARACTERISTICS It was developed as an observing kit for the Association of Lunar and Planetary Observers project titled LUNA INCOGNITA MAPPING PROGRAM. Experienced lunar observers instead of beginners or students should be involved. Project may be adapted for use in intermediate level astronomy courses in high school or college.

COMPONENTS (instructor x student x )
guide contains 4 desciptor pages and 11 charts in addition to selected bibliography for lunar observers separately available.
telescope and annual observing schedule required

INSTRUCTIONAL FORMAT
printed material

TIME FOR INSTRUCTION
open

EVALUATION OF MATERIALS

NUMBER OF TEST GROUPS ____
NUMBER OF SCHOOLS/INSTITUTIONS 30
TOTAL NUMBER OF STUDENTS INVOLVED ____
EVIDENCE OF EFFECTIVENESS 232 luna incognita drawings have been made using the observer kit.

LOCAL REPRODUCTION LIMITATIONS Local reproduction of charts permitted for educational uses.

LUNAR ECLIPSE HANDBOOK
(Laboratory project)

SOURCE ADDRESS John E. Westfall
Department of Geography
San Francisco State University
1600 Holloway Avenue
San Francisco, CA 94132

COST $1.50

TARGET GROUP Ages 15 to adult

POTENTIAL USES
laboratory project
astronomy club
self-instruction

GOAL Enable observers to make a variety of lunar eclipse observations that are of scientific value.

SPECIFIC OBJECTIVES
1. Understand lunar eclipse events and reasons for observing lunar eclipses.
2. Select and use appropriate equipment.
3. Determine general observing conditions.
4. Describe procedures for determining brightness using visual, photographic, and photoelectric methods.
5. Describe procedures for limb and crater contact timings for the earth shadow and types of changes on the lunar surface.

NATURE OF ACTIVITIES/CONTENT The handbook is a set of guidelines and procedures for making accurate lunar eclipse observations. Projects include making drawings and visual discriptions; visual, photographic, and photoelectric photometry; limb and crater contact timings, and photography.

GENERAL DESCRIPTION/UNIQUE CHARACTERISTICS It was developed as an observing kit for members of the Association of Lunar and Planetary Observers. Materials may be used for amateur groups and intermediate level astronomy courses in high school and college.

COMPONENTS (instructor x student x )
16 page guide
bibliography separately available
lunar eclipse observation forms may be obtained by writing the above address
telescopes, photographic and photometric equipment required

INSTRUCTIONAL FORMAT
printed material

TIME FOR INSTRUCTION
2 to 5 hours, open

EVALUATION OF MATERIALS

NUMBER OF TEST GROUPS ____
NUMBER OF SCHOOLS/INSTITUTIONS 50
TOTAL NUMBER OF STUDENTS INVOLVED ____
EVIDENCE OF EFFECTIVENESS Submission of successful observations by observers.

LOCAL REPRODUCTION LIMITATIONS Local reproduction privileges not granted.

LUNAR OBSERVATION PROJECT
(1 extended laboratory exercise)

SOURCE ADDRESS Walter J. Bisard
Physics Department
Central Michigan University
Mt. Pleasant, MI 48859

COST $1.00

POTENTIAL USES
astronomy class
earth science
adult education
course component

TARGET GROUPS Ages 15 to adult

GOAL Develop observation, recording and data interpretation skills and to understand eclipses, lunar orbital paths, and general sky motion.

SPECIFIC OBJECTIVES
1. Plot the position of the moon on a star chart from observations made.
2. Determine the lunar motions and orbit as projected against the constellations.
3. Determine how the moon's orbit relates to the ecliptic, eclipses and the visible sky observations.

NATURE OF ACTIVITIES-CONTENT Students observe and plot the moon's position on a star map and interpret the results as applied to astronomical concepts and observations. The project lends itself well to large classes because in order to complete the project the students must learn constellations and some aspects of observational astronomy.

GENERAL DESCRIPTION-UNIQUE CHARACTERISTICS This is a lab which covers one month or at least seven different observations. Students observe, record and interpret data within the framework of a model. This would work best as a semester-long project and is designed for use with the non-science student.

COMPONENTS (instructor ___ student _x_ )
student material and format for lunar observations

INSTRUCTIONAL FORMAT
printed material

TIME FOR INSTRUCTION
one month but a full semester would be more effective

EVALUATION OF MATERIALS

Number of field test groups ____
Number of schools/institutions ____
Total number of students involved 1000
Evidence of effectiveness This is one of the most successful observation projects used for the non-science student.

LOCAL REPRODUCTION LIMITATIONS Contact author regarding reproduction.

LUNAR PHOTOELECTRIC PHOTOMETRY HANDBOOK
(Laboratory projects)

SOURCE ADDRESS John E. Westfall
Department of Geography
San Francisco State University
1600 Holloway Avenue
San Francisco, CA 94132

COST $4.00

TARGET GROUP Ages 15 to adult

POTENTIAL USES
laboratory project
astronomy club
self-instruction

GOAL Encourage observers to make useful photoelectric observations of the moon.

SPECIFIC OBJECTIVES
1. Understand the need for lunar photoelectric measurements.
2. Select appropriate sites for study.
3. Describe techniques of lunar photometry.
4. Describe modes of lunar photometry.

NATURE OF ACTIVITIES/CONTENT The handbook is a set of guidelines and procedures for making accurate photoelectric observations of the moon. Projects include albedo mapping, determination of photometric parameters of lunar sites, LTP search/detection, lunal eclipse colorimetry, and earthlight photometry.

GENERAL DESCRIPTION/UNIQUE CHARACTERISTICS It was developed as an observing kit for the members of the Association of Lunar and Planetary Observers. Materials may be used by amateur groups and intermediate level astronomy courses in high school and college. Appendix includes Apple microcomputer programs for reducing data to standard form.

COMPONENTS (instructor x student x )
43 page guide
selected lunar site properties
and maps provided
sample photometric reduction included
telescope and photoelectric photometer needed
computer optional
bibliography separately available

INSTRUCTIONAL FORMAT
printed materials

TIME FOR INSTRUCTION
open

EVALUATION OF MATERIALS

NUMBER OF TEST GROUPS ____
NUMBER OF SCHOOLS/INSTITUTIONS ____
TOTAL NUMBER OF STUDENTS INVOLVED ____
EVIDENCE OF EFFECTIVENESS Favorable comments from recipients.

LOCAL REPRODUCTION LIMITATIONS Local reproduction privileges not granted.

MEASURING THE ALTITUDE OF THE NOON SUN
(Laboratory exercises)

SOURCE ADDRESS Jeffrey Hunt
Planetarium
Waubonsie Valley H. S.
32 W 310 Route 34
Aurora, IL 60504

COST $.50

TARGET GROUP Ages 10 to 14

POTENTIAL USES
course component
self-instruction
classroom

GOAL Show the students noon positions of the sun throughout the year.

SPECIFIC OBJECTIVES
1. Determine at what month of the year is the sun highest.
2. Determine what is the altitude of the sun in relation to seasons.
3. Determine at what month of the year is the sun lowest.
4. Plot the sun positions.
5. Calculate the tilt of the earth.

NATURE OF ACTIVITIES/CONTENT Students measure the altitude of noon sun in planetarium, record data, graph that data, and answer questions about their observations.

GENERAL DESCRIPTION/UNIQUE CHARACTERISTICS A question, data, and graph sheet for observations of the noon day sun are provided.

COMPONENTS (instructor x student x )
guide for student and teacher
planetarium required

INSTRUCTIONAL FORMAT
printed material
for planetarium observation

TIME FOR INSTRUCTION
90 minute session
can be split over multiple session

EVALUATION OF MATERIALS

| | |
|---|---|
| NUMBER OF TEST GROUPS | 20 |
| NUMBER OF SCHOOLS/INSTITUTIONS | 5 |
| TOTAL NUMBER OF STUDENTS INVOLVED | 600 |
| EVIDENCE OF EFFECTIVENESS | |

LOCAL REPRODUCTION LIMITATIONS Local reproduction privileges granted for educational uses. Acknowlegement of use and source requested.

THE OBSERVE SERIES

1. A GUIDE TO THE MESSIER OBJECTS
2. THE HERSCHELL OBJECTS
3. UNDERSTAND THE SUN
4. ECLIPSES
5. COMETS

(Laboratory projects)

SOURCE ADDRESS ASTRONOMICAL LEAGUE BOOK SERVICE
1001 S. Cornelia Street
Sioux City, Iowa 51106

COST 1-4 $4.19
5 $6.19
Discounts for orders more than 10

TARGET GROUP Ages 15 to adult

POTENTIAL USES
field
self-instruction
course component
community groups
laboratory component

GOAL Provide information and projects dealing with celestial objects.

SPECIFIC OBJECTIVES

1. Identify and describe basic concepts and vocabulary.
2. Develop observational skills and techniques.
3. Record data through observe data and monitoring instruments.
4. Interpret collected data.

NATURE OF ACTIVITIES/CONTENT

1. A Guide to Messier Objects provides descriptions and photographs of the object. A log is provided for notes when observing the objects.
2. The Herschel Objects gives descriptions of 400 Herschel objects. A log is provided for notes when observing the objects.
3. Understand the Sun describes solar phenomena observable with amateur instruments. It provides a method of sunspot classification and describes how to plot sunspots. Optical and radial instruments which can be constructed are described for solar observing.
4. Eclipses describes and diagrams how lunar and solar eclipses occur. Methods of observing both types of eclipses and what can be observed during each are given.
5. Comets provides descriptions and diagrams of comets and their orbits. It describes methods of observing and tracking motions.

GENERAL DESCRIPTION/UNIQUE CHARACTERISTICS A bibliograpy is provided with each of the books. Sample recording sheets appear very useful. The books are softbound.

COMPONENTS (instructor x student x )
5 Softbound books (35-55 pages)
some equipment required.

INSTRUCTIONAL FORMAT
printed material

TIME FOR INSTRUCTION
open

EVALUATION OF MATERIALS

| | |
|---|---|
| NUMBER OF TEST GROUPS | yes |
| NUMBER OF SCHOOLS/INSTITUTIONS | yes |
| TOTAL NUMBER OF STUDENTS INVOLVED | |
| EVIDENCE OF EFFECTIVENESS | |

LOCAL REPRODUCTION LIMITATIONS Request for reproduction should be addressed to the above address stating reason for reproduction.

OBSERVING LUNAR PHASES
(Laboratory activities)

SOURCE ADDRESS Ted E. Baker
951 Airport Way
FBX, AK 99701

COST $1.00 booklet
$20.00 transparancy
(1 needed)

TARGET GROUP Ages 10 to adult

POTENTIAL USES
course component

GOAL Introduce students to the lunar cycle.

SPECIFIC OBJECTIVES
1. Construct an astrolabe.
2. Use a starfinder and a star map to calculate the moon's east-west motion.
3. Plot the moon's position on a graph.
4. Calculate the length of a lunar month using your graph.

NATURE OF ACTIVITIES/CONTENT Students build an astrolabe and use it to measure the moon's altitude. They learn how to read a starfinder and a star map and plot the moon's position for a month. This data is finally analyzed resulting in basic concepts of the lunar cycle.

GENERAL DESCRIPTION/UNIQUE CHARACTERISTICS Can be tied into a computer simulation program. Charts and maps provided in the booklet.

COMPONENTS (instructor x student x )
17 page student guide
take home lab
observation data sheets
observation plot sheets
examples
additional-not included in guide:
starfinders (Edmund Scientific Co.), starfinder transparancy (about $20.00), Ephemeris

INSTRUCTIONAL FORMAT
printed materials for guiding activities

TIME FOR INSTRUCTION
open

EVALUATION OF MATERIALS

NUMBER OF TEST GROUPS 18
NUMBER OF SCHOOLS/INSTITUTIONS 1
TOTAL NUMBER OF STUDENTS INVOLVED 450
EVIDENCE OF EFFECTIVENESS students were able to complete the lab and answer related questions on texts.

LOCAL REPRODUCTION LIMITATIONS Local reproduction privileges granted for educational uses.

PROPERTIES OF PULSARS AND THE INTERSTELLAR MEDIUM
(Laboratory exercise)

SOURCE ADDRESS Kurtiss J. Gordon
Computer and Info. Science Dept.
University of Massachusetts
Amherst, MA 01003

COST $0.60 ($1.60 including billing)
multiple copies discount

POTENTIAL USES
classroom
course component
teacher education

TARGET GROUP Ages 15 to adult

GOAL Introduce students to pulsars and their uses as probes of the interstellar medium.

SPECIFIC OBJECTIVES
1. Measure periods and dispersion of pulsars.
2. Determine estimated distances to pulsars.
3. Determine Faraday rotation and the strength of interstellar magnetic field of pulsars.

NATURE OF ACTIVITIES/CONTENT Using multichannel chart-recordings of radio signals from pulsars and tabular values of observed pulsar polarization, students measure and determine some basic properties of individual pulsars.

GENERAL DESCRIPTION/UNIQUE CHARACTERISTICS A good integration of laboratory data and classroom lecture material.

COMPONENTS (instructor x student ___ )
12 page instructor guide
rulers, pencil, and graph paper needed.

INSTRUCTIONAL FORMAT
printed material

TIME FOR INSTRUCTION
2 to 3 sessions

EVALUATION OF MATERIALS

| | |
|---|---|
| NUMBER OF TEST GROUPS | 6 |
| NUMBER OF SCHOOLS/INSTITUTIONS | 3 |
| TOTAL NUMBER OF STUDENTS INVOLVED | 150 |

EVIDENCE OF EFFECTIVENESS Anecdotal evidence of student interest and enthusiasm.

LOCAL REPRODUCTION LIMITATIONS Local reproduction privileges granted for educational use.

"REMINDERS"---"Where is the Moon?"
(Field observing sheets)

SOURCE ADDRESS Russ Harding
187 Noroton Avenue
Darien, CT 06820

COST $5.00/year

TARGET GROUP Ages 9 to 12

POTENTIAL USES
field
lab component
unit component
community groups

GOAL Provide students with clear daily instruction for observing the moon.

SPECIFIC OBJECTIVES
1. Observe and draw the moon as seen in the sky.
2. Collect data through sky drawings.
3. Interpret sky drawings to better understand the earth, moon, and sun model.

NATURE OF ACTIVITIES/CONTENT A series of questions of the moon's position and phases coupled with nightly drawings of the moon leading to a sun, earth, and moon model. The actual model uses small balls for the earth and moon and light source for the sun.

GENERAL DESCRIPTION/UNIQUE CHARACTERISTICS Daily messages are provided for teachers to make student observing assignments.

COMPONENTS (instructor x student x )
Reminders are given for one year

INSTRUCTIONAL FORMAT
printed format

TIME FOR INSTRUCTION
open

EVALUATION OF MATERIALS

| | |
|---|---|
| NUMBER OF TEST GROUPS | 100's |
| NUMBER OF SCHOOLS/INSTITUTIONS | 100's |
| TOTAL NUMBER OF STUDENTS INVOLVED | 1000's |
| EVIDENCE OF EFFECTIVENESS | |

LOCAL REPRODUCTION LIMITATIONS Local reproduction privileges granted for educational uses.

SKY PHOTOGRAPHY
(3 extended lab activities)

SOURCE ADDRESS Jeffrey Hunt
Planetarium
Waubonsie Valley H.S.
32 w 310, Route 34
Aurora, IL 60504

COST $.50

TARGET GROUP Ages 10 to 14

POTENTIAL USES
course component

GOAL Obtain photographs of constellations to be used in classroom teaching activities.

SPECIFIC OBJECTIVES
1. Make photographic records of constellations.
2. Photograph and examine star trails.
3. Perform aurora, meteor, and satellite photography.

NATURE OF ACTIVITIES/CONTENT Can be used to help students learn to identify constellations in addition to techniques in sky photography.

GENERAL DESCRIPTION/UNIQUE CHARACTERISTICS An instruction sheet on night sky photography with some classroom suggestions for best results.

COMPONENTS (instructor x student x )
2 page guide for teacher or students

INSTRUCTIONAL FORMAT
printed material

TIME FOR INSTRUCTION
open

EVALUATION OF MATERIALS

NUMBER OF TEST GROUPS ____
NUMBER OF SCHOOLS/INSTITUTIONS ____
TOTAL NUMBER OF STUDENTS INVOLVED ____
EVIDENCE OF EFFECTIVENESS

LOCAL REPRODUCTION LIMITATIONS Local reproduction privileges granted for educational uses.

TIDES
(Laboratory exercise)

SOURCE ADDRESS Mary Dean E. Winchester
5212 Windsor Lane
Virginia Beach, VA 23464

COST $.75

POTENTIAL USES
course component
self-instruction

TARGET GROUP Ages 10 to adult

GOAL Introduce the causes of tides.

SPECIFIC OBJECTIVES
1. Plot tide heights for six days from presented data.
2. Answer questions from data, chart, and plots made. Compare spring and neap tide plots.
3. Develop ideas as to the cause of tides given astronomical data and tide plots.
4. Develop definitions of basic tide terminology.

NATURE OF ACTIVITIES/CONTENT A laboratory activity involving measured data, astronomical information and student scientific processes of investigation. Using scientific processes of data interpretation, students inquire into the nature of tides.

GENERAL DESCRIPTION/UNIQUE CHARACTERISTICS Tide data obtained from Virginia Institute of Marine Science.

COMPONENTS (instructor ___ student x )
4 page lab packet

INSTRUCTIONAL FORMAT
printed materials to guide lab activity

TIME FOR INSTRUCTION
45 minutes

EVALUATION OF MATERIALS

NUMBER OF TEST GROUPS 10
NUMBER OF SCHOOLS/INSTITUTIONS 1
TOTAL NUMBER OF STUDENTS INVOLVED 250
EVIDENCE OF EFFECTIVENESS students quickly relate astronomical events to tides.

LOCAL REPRODUCTION LIMITATIONS Local reproduction privileges granted for educational uses.

WHERE IS THE EARTH? 81
(3 Laboratory exercises)

SOURCE ADDRESS Larry Dunlap
Flandrau Planetarium
University of Arizona
Tuscon, AZ 85721

COST $1.25

POTENTIAL USES
course component

TARGET GROUP Ages 15 to adult

GOAL Illustrate how to compute the relative sun-planet distances from observation of the planets at particular times of the year.

SPECIFIC OBJECTIVES
1. Compute synodic periods of Mercury and Jupiter.
2. Determine relative distances of Mercury and Venus from the Sun.
3. Find the distance from the Sun to Jupiter.
4. Visualize the relationship between the synodic and sidereal period or frequency of a planet.

NATURE OF ACTIVITIES/CONTENT Observe the positions of visible planets relative to the sun at particular times. Assuming circular orbits, find the orbital sidereal periods using a self guided instructional packet.

GENERAL DESCRIPTION/UNIQUE CHARACTERISTICS A lab activity to be used in astronomy or physics.

COMPONENTS (instructor x student x )
A complete lab activity with
instructor materials
student worksheets, procedures and
an operation outline, 10 pages.
(Planetarium laboratory activity, Where is the Earth?, classroom ideas)

INSTRUCTIONAL FORMAT
printed material

TIME FOR INSTRUCTION
1 hr. in a planetarium
2-3 hrs. in class for
preparation and analysis of data

EVALUATION OF MATERIALS

| | |
|---|---|
| NUMBER OF TEST GROUPS | 40 |
| NUMBER OF SCHOOLS/INSTITUTIONS | 6 |
| TOTAL NUMBER OF STUDENTS INVOLVED | 800 |

EVIDENCE OF EFFECTIVENESS Very popular with teachers using PSSC Physics or Project Physics.

LOCAL REPRODUCTION LIMITATIONS Local reproduction privileges granted for educational uses.

# CURRICULUM GUIDES AND LABORATORY MANUALS

ASTRONOMY ACTIVITIES FOR SECONDARY SCHOOLS
(Laboratory and classroom activity guide)

SOURCE ADDRESS Paul H. Knappenberger
Science Museum of Virginia
2500 W. Broad ST.
Richmond, VA 23220

COST $2.00+
$1.25 postage

POTENTIAL USES
classroom
workshop
course component
teacher education

TARGET GROUP Ages 10 to adult

GOAL Improve the teaching of astronomy in secondary school by using classroom-tested activities on selected topics.

SPECIFIC OBJECTIVES ( Selected examples)
1. Identify the Big Dipper and locate the North Star in the sky.
2. Describe the path of Mars through a background star field over specific dates.
3. Compute the rotational period of the sun.
4. Graph and describe the variation in sunspot numbers with time.
5. Diagram the relationship between intrinsic brightness and temperature of stars.
6. Measure and describe changes in the sun's altitude.

NATURE OF ACTIVITIES/CONTENT Thirteen different classroom activities that include making and using simple star maps, making an astrolabe, plotting the path of Mars, measuring the sun's altitiude and azimuth, observing and interpreting data about sunspots, relating brightness and temperature of stars, and solving puzzles.

GENERAL DESCRIPTION/UNIQUE CHARACTERISTICS A series of activities which can be used to supplement teaching an astronomy unit. In addition to lab activities, included in the guide are word finding and crossword puzzles, workshop evaluation sheets, and student data and evaluation sheets.

COMPONENTS (instructor x student x )
50 page guide
simple materials required.

INSTRUCTIONAL FORMAT
printed materials

TIME FOR INSTRUCTION
13 one-hour sessions

EVALUATION OF MATERIALS

| | |
|---|---|
| NUMBER OF TEST GROUPS | 20 |
| NUMBER OF SCHOOLS/INSTITUTIONS | 20 |
| TOTAL NUMBER OF STUDENTS INVOLVED | 600 |

EVIDENCE OF EFFECTIVENESS Comments from teacher evaluations have been positive.

LOCAL REPRODUCTION LIMITATIONS Local reproduction privileges granted for educational purposes.

ASTRONOMY CORE CURRICULUM: GRADES TWO, SIX, EIGHT, AND HIGH SCHOOL
(Curriculum guide)

SOURCE ADDRESS Gary E. Sampson
Wauwatosa West Sr. High School
11400 W. Center ST.
Wauwatosa, WI 53222

COST $6.00

POTENTIAL USES
unit component
course component
teacher education

TARGET GROUP Ages 7 to 18

GOAL Provide a 'core' curriculum in astronomy for grades K-12, with 4 age groups being highlighted.

SPECIFIC OBJECTIVES
1. Provide information on rationale, lesson outlines, planetarium sessions, and lab activities.
2. Describe sample objectives, vocabulary lists, exam questions, projects, and references.

NATURE OF ACTIVITIES/CONTENT A curriculum guide in astronomy for units in grades 2, 6, and 8 and a course at the high school level. Each age group section includes lesson outlines, classroom activities, a glossary, and suggested resources.

GENERAL DESCRIPTION/UNIQUE CHARACTERISTICS A basic planning reference for developing a system wide astronomy curriculum.

COMPONENTS (instructor _x_ student ___ )
117 page curriculum guide
planetarium optional

INSTRUCTIONAL FORMAT
printed materials

TIME FOR INSTRUCTION
grades 2,6,8 10 sessions+ planetarium visit
high school 90 sessions or semester

EVALUATION OF MATERIALS

| | |
|---|---|
| NUMBER OF TEST GROUPS | many |
| NUMBER OF SCHOOLS/INSTITUTIONS | 13 |
| TOTAL NUMBER OF STUDENTS INVOLVED | many |
| EVIDENCE OF EFFECTIVENESS | |

LOCAL REPRODUCTION LIMITATIONS Local reproduction privileges granted for educational purposes.

ASTRONOMY THROUGH PRACTICAL INVESTIGATIONS
(35 Classroom and laboratory activity sets)

SOURCE ADDRESS LSW Publications
P.O. Box 82
Mattituck, NY 11952

COST $0.75 each
$24.20 + $2.50 postage and handling for complete set + Edmond Starfinder and protractor ruler

DEVELOPER G. Lomaga, W. Smiley, & R. Warasila
Suffolk County Community College
Selden, NY 11784

POTENTIAL USES
independent study courses
laboratory component
whole lab course

TARGET GROUPS Ages 16 to adult

GOAL Provide laboratory activities for students enrolled in introductory astronomy and physical science courses.

SPECIFIC OBJECTIVES
1. Answer questions involving terminology
2. Apply concepts in interpreting photographs, charts, and diagrams
3. Perform inquiry investigations and solve problems using data, photographs and described events

NATURE OF ACTIVITIES-CONTENT
35 modules include (select examples):
11. Horizon System
12. Equatorial System
13. Sidereal time
18. Terrestrial Planet - Mars
33. The Material Between the Stars

GENERAL DESCRIPTION-UNIQUE CHARACTERISTICS These are self-contained modules stressing fundamental astronomical concepts.

COMPONENTS (instructor x student x )

each module contains:
- background information
- questions and problems
- answer keys are available from source

INSTRUCTIONAL FORMAT
printed materials to guide activities

TIME FOR INSTRUCTION
1-2 hours per module

EVALUATION OF MATERIALS
Used at 300 institutions.

LOCAL REPRODUCTION LIMITATIONS Local licensing agreements negotiable.

CLASSROOM ACTIVITIES IN ASTRONOMY
(22 Laboratory activities)

SOURCE ADDRESS Michael Zeilik
Department Physics and Astronomy
University of New Mexico
Albuquerque, NM 87131

COST $5.00

TARGET GROUP Ages 10 to adult

POTENTIAL USES
course component

GOAL Provide students with hands-on activities in astronomy.

SPECIFIC OBJECTIVES
1. Show the quadrant of the sky in which a certain constellation is located.
2. Estimate the brightness of a star using a prescribed procedure.
3. Use a sun dial at a specific latitude to tell time at different times throughout the day.
4. Given a time lapse film loop of one of Jupiter's moons, determine the radius and the period of its orbit.

NATURE OF ACTIVITIES/CONTENT The guide includes approximately 110 pages of graphs, charts, and instructions for astronomy activities and labs for a variety of student needs.

GENERAL DESCRIPTION/UNIQUE CHARACTERISTICS The activities in this booklet were submitted by participants in the Intensive Summer Workshop in Astronomy held at the University of New Mexico during the summer of 1980. The participants were science teachers in middle and high schools in the Albuquerque area.

COMPONENTS (instructor x student x )
Instructor material included in a lab manual type publication.
gives grade level and objective for most activities
Contents include: Constellation studies, Solar system models, Solar system observations, Solar system motions, Spectra and HR Diagrams, others

INSTRUCTIONAL FORMAT
printed material

TIME FOR INSTRUCTION
times range 30 minutes to hours

EVALUATION OF MATERIALS

NUMBER OF TEST GROUPS 10
NUMBER OF SCHOOLS/INSTITUTIONS 5
TOTAL NUMBER OF STUDENTS INVOLVED 100
EVIDENCE OF EFFECTIVENESS Evaluation in progress.

LOCAL REPRODUCTION LIMITATIONS Local reproduction privileges granted for educational uses.

CURRICULUM GUIDE FOR WESTERN SCHOOL CORPORATION
(Planetarium and classroom activity guides)

SOURCE ADDRESS Gail Bouslog
Planetarium Director
Western High School
Russiaville, IN 46979

COST Check number below
1. $.80; 2-5. $1.50;
6. $2.00; 7. $6.00;
8. $3.50; 9. $8.00;
10. $4.00; 11. $8.50;
12. $2.50

TARGET GROUP Ages 5 to adult

POTENTIAL USES
planetarium curriculum guide

GOAL Introduce students to the planetarium classroom.

NATURE OF ACTIVITIES/CONTENT
1. Kindergarten--Meet the Planetarium (Introduce the Planetarium machine.)
2. 1st grade-----Day and Night Sky (What can be observed)
3. 1st grade-----Seasons, Sun, Moon, and Stars (Sun as a nearby star)
4. 2nd grade-----Sun, Seasons, and Stars
5. 2nd grade-----Satellites and the Sounds of Space
6. 3rd grade-----Moon Phases (Moon's phases as the sun rises and sets)
7. Middle grades--Constellation Mythology/Spring
8. Middle grades--Constellation Mythology/Summer
9. Middle grades--Constellation Mythology/Autumn
10. Middle grades--Constellation Mythology/Winter
11. 8th grade-----Programs: Celestial Sphere, Where is it?, Milky Way, Nebulae, Islands in Space, Beyond our Galaxy
12. 9th grade-----Programs: Earth's Atmosphere, Earth's Rotation, Revolution, Star of Life, Genesis, End of the World

GENERAL DESCRIPTION/UNIQUE CHARACTERISTICS This is a planetarium curriculum guide for elementary and middle grade students to grade 9. One could ask for a guide for a particular grade. The materials contain planetarium scripts, student sheets, and tests.

COMPONENTS (instructor x student x )
12 curriculum guides
Worksheets, pictures, and student evaluations includes.

INSTRUCTIONAL FORMAT
printed materials

EVALUATION OF MATERIALS

| | |
|---|---|
| NUMBER OF TEST GROUPS | 8 |
| NUMBER OF SCHOOLS/INSTITUTIONS | 1 |
| TOTAL NUMBER OF STUDENTS INVOLVED | 220 |
| EVIDENCE OF EFFECTIVENESS | |

LOCAL REPRODUCTION LIMITATIONS Local reproduction privileges granted for educational uses.

DAYTIME ASTRONOMY
(22 activities)

SOURCE ADDRESS Dorothy Stockton
1414 Floweree
Helena, MT 59601

COST $3.00 for postage

TARGET GROUP Ages 10 to 14

POTENTIAL USES
course component
lab component

GOAL Observe and record data on daytime astronomical activities.

SPECIFIC OBJECTIVES
1. Construct and use a sundial.
2. Determine the height of a tall object using its shadow.
3. Visualize the earth moon dance around the sun.
4. Use moon longitude and latitude.
5. Construct and use an analemma.

NATURE OF ACTIVITIES/CONTENT A series of activities ranging from making primative calendars to measuring distance in space.

GENERAL DESCRIPTION/UNIQUE CHARACTERISTICS This can be used as a full course in daytime astronomy or used for supplementary activities for any astronomy or physics course.

COMPONENTS (instructor x student x )
22 activities in 33 pages of a lab manual type format. Objectives are included for each activity.

INSTRUCTIONAL FORMAT
printed material

1. Primative calendars
2. Sundials
3. Shadows
4. Moon phases
5. Craters on the Moon
6. Crash landing on the Moon
7. Eliptic path of the Moon
8. Clinometer
9. Starfinder
10. Planetarium in a bottle
11. Earth is a BB-the Sun is a Balloon
12. Analemana
13. The Solar System on your wall
14. Passing planets
15. Superbirds View of the Solar System
16. Measuring the Sun
17. How Big is Big
18. Plane Table
19. Telescope Images
20. Bode's Law
21. Kepler's Harmonic Law
22. Calculation of a Light Year

TIME FOR INSTRUCTION
activities vary

EVALUATION OF MATERIALS

NUMBER OF TEST GROUPS 8
NUMBER OF SCHOOLS/INSTITUTIONS 1
TOTAL NUMBER OF STUDENTS INVOLVED 50
EVIDENCE OF EFFECTIVENESS interest of students

LOCAL REPRODUCTION LIMITATIONS Local reproduction privileges granted for educational uses.

FOR SPACIOUS SKIES
(Guide for 8 activity sets)

SOURCE ADDRESS Jack Bordon
3 Joy Street
Boston, MA 02108

COST $5.00+
handling

POTENTIAL USES
unit component
large group
community groups

TARGET GROUP Ages 6 to 15

GOAL Provide students with ongoing awareness of the appearance of the sky.

SPECIFIC OBJECTIVES
1. Develop observational skills.
2. Understand and use a compass.
3. Using magnifying lenses.
4. Using prisms.
5. Using binoculars and recording sky phenomena.
6. Using a thermometer and making weather predictions.
7. Observing and tracking objects in the sky.
8. Identifying sky themes in music.

NATURE OF ACTIVITIES/CONTENT The guide contains 8 multi-lesson activity sets. A step by step discussion of each activity is given for the teacher.

GENERAL DESCRIPTION/UNIQUE CHARACTERISTICS The intent is to heighten continuous awareness of the sky. An excellent guide for elementary teachers. Recommended reading list is provided.

COMPONENTS (instructor x student ___ )
32 page activity guide
An equipment kit is available from the same address for $69.95 + handling. (This kit is optional. Materials may be found in most schools and homes.)

INSTRUCTIONAL FORMAT
printed materials

TIME FOR INSTRUCTION
open

EVALUATION OF MATERIALS

| | |
|---|---|
| NUMBER OF TEST GROUPS | yes |
| NUMBER OF SCHOOLS/INSTITUTIONS | yes |
| TOTAL NUMBER OF STUDENTS INVOLVED | yes |
| EVIDENCE OF EFFECTIVENESS | |

LOCAL REPRODUCTION LIMITATIONS Local reproduction privileges not granted.

FROM NAKED EYE TO DEEP SKY
(Field and classroom observational activity guide)

SOURCE ADDRESS George C. Atamian
135 Prestige Park Circle
East Hartford, CT 06108

COST $4.98+ postage and handling

POTENTIAL USES
laboratory component
workshop
self-instruction
community groups

TARGET GROUP Ages 15 to adult

GOAL Provide beginners with the observational understanding and skills needed to "see" celestial objects, track them, predict their motions, photograph them, and generally enhance their techniques in this area.

SPECIFIC OBJECTIVES
1. Understand basic vocabulary.
2. Understand basic observation skills using the eye and binoculars.
3. Determine distances to planets.
4. Construct a planetary map.
5. Use star charts.
6. Compare 30 brightest and 30 nearest stars.

NATURE OF ACTIVITIES/CONTENT The guide contains activities for using lunar maps, constructing solar system maps, measuring sizes of objects of known distance, and finding objects on star maps with right ascension and declination.

GENERAL DESCRIPTION/UNIQUE CHARACTERISTICS

COMPONENTS (instructor x student x )
52 page guide to observational astronomy
star map
binoculars (optional)

INSTRUCTIONAL FORMAT
printed materials

TIME FOR INSTRUCTION
open

EVALUATION OF MATERIALS

| | |
|---|---|
| NUMBER OF TEST GROUPS | 5 |
| NUMBER OF SCHOOLS/INSTITUTIONS | 3 |
| TOTAL NUMBER OF STUDENTS INVOLVED | 700 |
| EVIDENCE OF EFFECTIVENESS | |

LOCAL REPRODUCTION LIMITATIONS Local reproduction privileges not granted.

LABORATORY MANUAL FOR INTRODUCTORY ASTRONOMY
(14 Laboratory exercises)

SOURCE ADDRESS
Charles F. Hagar
Planetarium Institute
Dept. of Physics and Astronomy
San Francisco State University
San Francisco, CA 94132

COST $5.00 + $1.00 postage and handling

TARGET GROUP Ages 15 to adult

POTENTIAL USES
laboratory course
lab component
teacher education
workshop

GOAL Provide "hands on" experiences in sky observing in the field, planetarium, and observatory to complement an introductory astronomy lecture course.

SPECIFIC OBJECTIVES
1. Identify, name, and point out the principal seasonal constellations and stars.
2. Observe the movement of the Big Dipper during a single evening.
3. Determine the synodic and sidereal period of Mercury and the relative size of its orbit.
4. Determine a value for the Hubble Constant and use it in calculating galactic distance.
5. Accurately estimate the apparent visual magnitude of 10 selected stars by comparison with standard stars.

NATURE OF ACTIVITIES/CONTENT There are 14 investigative activities spread over 8 content areas of which 8 sessions are planetarium, 2 observatory, and 4 classroom laboratory oriented.

GENERAL DESCRIPTION/UNIQUE CHARACTERISTICS A complete lab course containing constellation maps, data sheets, reference diagrams, and observation charts.

COMPONENTS (instructor x student x )
90 page paperback notebook containing data sheets, charts, and diagrams.
instructor's manual and student evaluation forms
lab equipment needed on a number of activities

INSTRUCTIONAL FORMAT
printed material

TIME FOR INSTRUCTION
14 sessions approximately 150 minutes each

EVALUATION OF MATERIALS

| | |
|---|---|
| NUMBER OF TEST GROUPS | 240 |
| NUMBER OF SCHOOLS/INSTITUTIONS | 1 |
| TOTAL NUMBER OF STUDENTS INVOLVED | 6000+ |

EVIDENCE OF EFFECTIVENESS Non-science students like the format, especially the planetarium work. In use for 10 years.

LOCAL REPRODUCTION LIMITATIONS Local reproduction privileges not granted. Contact source.

LABORATORY MANUAL FOR INTRODUCTORY ASTRONOMY
(20 Lab lessons)

SOURCE ADDRESS Dinah Moche
Physics Department
Queensborough Community College
Bayside, NY 11364

COST $2.25 plus postage (60 pages)

TARGET GROUP Ages 15 to adult

POTENTIAL USES
lab component
course component

GOAL Provide a one semester introductory course with indoor and outdoor activities.

SPECIFIC OBJECTIVES
1. Understand operation of a telescope.
2. Study spectral composition of light emitted by hot gases.
3. Calculate simple measurements of distance and angular positions in space.
4. Classify the spectra of several stars.
5. Make observations of celestial objects.

NATURE OF ACTIVITIES/CONTENT A variety of lab activities attempting to provide activities to help develop skills and abstract concepts.

GENERAL DESCRIPTION/UNIQUE CHARACTERISTICS Booklet includes graphs, tables, charts, and writing space for most activities.

COMPONENTS (instructor ___ student _x_ )
paperback lab manual
contains 20 lab day and night activities

INSTRUCTIONAL FORMAT
printed material

TIME FOR INSTRUCTION
one semester

EVALUATION OF MATERIALS

| | |
|---|---|
| NUMBER OF TEST GROUPS | ____ |
| NUMBER OF SCHOOLS/INSTITUTIONS | 1 |
| TOTAL NUMBER OF STUDENTS INVOLVED | 1000 |
| EVIDENCE OF EFFECTIVENESS | |

LOCAL REPRODUCTION LIMITATIONS This material is based upon work supported by the National Science Foundation under Grant No. SER 78-06372. Contact source for local reproduction privileges.

MEASUREMENTS AND MODELS IN ASTRONOMY
(6 Lab exercises)

SOURCE ADDRESS Thomas F. McGuire
Astronomy Instructor
Briarcliff High School
Briarcliff Manor, NY 10510

COST $2.00

TARGET GROUP Ages 15 to adult

POTENTIAL USES
course component
large groups

GOAL Introduce students to measurements and creative methods used in astronomy.

SPECIFIC OBJECTIVES
1. Draw a scale model of the orbit of Venus.
2. Plot and draw planet orbits illustrating Kepler's three laws of motion.
3. Calculate and draw planet orbits using Bode's Sequence.
4. Design a Mars research station.
5. Measure distance by parallax.
6. Plot objects on linear and logarithmic scales.

NATURE OF ACTIVITIES/CONTENT Six activities are provided which emphasize methods of measurement and the construction and use of models.

GENERAL DESCRIPTION/UNIQUE CHARACTERISTICS Provides additional concrete paper pencil activities for abstract astronomical concepts.

COMPONENTS (instructor ___ student x )
7 page activity lab form

INSTRUCTIONAL FORMAT
printed material

TIME FOR INSTRUCTION
10 sessions approximately
40 minutes per session

EVALUATION OF MATERIALS

| | |
|---|---|
| NUMBER OF TEST GROUPS | 1 |
| NUMBER OF SCHOOLS/INSTITUTIONS | 1 |
| TOTAL NUMBER OF STUDENTS INVOLVED | 6 |
| EVIDENCE OF EFFECTIVENESS | |

LOCAL REPRODUCTION LIMITATIONS Local reproduction privileges granted for educational uses.

OUTLINE OF LABORATORY ASSIGNMENTS FOR AN 8-SESSION OBSERVATIONAL ASTRONOMY COURSE (Laboratory guide)

SOURCE ADDRESS Robert R. Young, Ed. Chairman
Astronomical Society of Harrisburg
329 S. Front Street
Harrisburg, PA 17104

COST Self-addressed stamped envelope

TARGET GROUP Ages 15 to adult

POTENTIAL USES
course component
community groups
laboratory component
classroom

GOAL Help students develop the ability to use a telescope, find objects in the sky using star charts; use ephemerides, take simple astrophotographs, and observe the sky with the naked eye and binoculars.

SPECIFIC OBJECTIVES
1. Use a telescope for observation.
2. Transfer star chart information over into observation of the sky.
3. Take pictures of the sky through the use of astrophotography.
4. Gain working knowledge of the sky without the aid of equipment.

NATURE OF ACTIVITIES/CONTENT The material outlines sessions for use in teaching observation techniques to students.

GENERAL DESCRIPTION/UNIQUE CHARACTERISTICS An observing laboratory outline for an introductory course.

COMPONENTS (instructor x student ___ )
2 page teacher guide
Many pieces of observational equipment will be necessary.
Books or guides necessary

INSTRUCTIONAL FORMAT
printed material

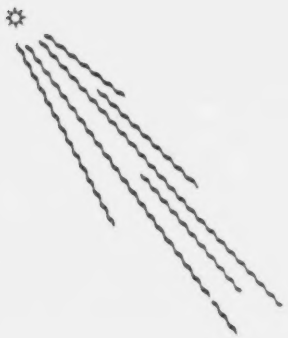
TIME FOR INSTRUCTION
8 90-minute sessions

EVALUATION OF MATERIALS

| | |
|---|---|
| NUMBER OF TEST GROUPS | 5 |
| NUMBER OF SCHOOLS/INSTITUTIONS | 1 |
| TOTAL NUMBER OF STUDENTS INVOLVED | 202 |

EVIDENCE OF EFFECTIVENESS It has been used for several years in a highly popular introductory observational astronomy course for a local astronomical society and observatory.

LOCAL REPRODUCTION LIMITATIONS Local reproduction privileges granted for educational uses.



# HALLEY'S COMET MATERIALS

COMET HALLEY OBSERVER'S GUIDE
(Resource guide)

SOURCE ADDRESS Carl J. Wenning
Physics Department Planetarium
Illinois State University
Normal, Illinois 61761

COST $3.00
multiply copy
discounts available

TARGET GROUP Ages 12 to adult

POTENTIAL USES
self-instruction
groups
teacher education

GOAL Assist the general public with their observations of Halley's Comet.

SPECIFIC OBJECTIVES
1. Observe Halley's Comet.
2. Provide information about the comet, its history, its physical structure, and its appearance.
3. Provide additional information for planetarium presentations.

NATURE OF ACTIVITIES/CONTENT The guide is an introduction to the 1986 apparition of Halley's Comet.

GENERAL DESCRIPTION/UNIQUE CHARACTERISTICS Halley' Comet will not likely be an easy naked-eye object and the general public will need the assistance of planetarium personnel or astronomers to view the comet. Persons in possession of the guide will receive detailed information about how, when, and where to see the comet. The guide utilizes a unique approach which details the motion of the comet through the solar system, among the constellations, and relative to the horizon.

COMPONENTS (instructor x student x )
observer's guide
3 tables, 7 diagrams
several appendices

INSTRUCTIONAL FORMAT
printed materials

TIME FOR INSTRUCTION
open

EVALUATION OF MATERIALS

NUMBER OF TEST GROUPS ____
NUMBER OF SCHOOLS/INSTITUTIONS ____
TOTAL NUMBER OF STUDENTS INVOLVED ____
EVIDENCE OF EFFECTIVENESS The guide is in high demand.

LOCAL REPRODUCTION LIMITATIONS Local reproduction privileges not granted.

COMET HALLEY
(Computer program)

SOURCE ADDRESS Wayne Osborn
Physics Department
Central Michigan University
Mt. Pleasant, MI 48859

COST Free if disk is sent+ $.75 postage

TARGET GROUP Ages 10 to adult

COMPATABILITY IBM-PC

GENERAL DESCRIPTION The program allows students to predict characteristics of the motion of Halley's Comet. The program can be used to plot the orbit, learn were to look on the horizon, determine brightness, and find position. Local reproduction privileges are granted for educational uses.

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COMETS
(Computer programs)

SOURCE ADDRESS Dennis W. Sunal
Division of Education
604 Allen Hall
West Virginia University
Morgantown, WV 26506

COST Free if disk is sent+ $.75 postage

TARGET GROUP Ages 10 to adult

COMPATABILITY Apple II, IIe

GENERAL DESCRIPTION Contains the same program as Comet Halley by Wayne Osborn (see description above) plus additional public domain programs plotting comet orbits.

COMETS AND COMET HALLEY
(SLIDE SET)

SOURCE ADDRESS Comet Slides Dept.
Astronomical Society of the Pacific
1290 24th Avenue
San Francisco, CA 94122

COST $25.95

TARGET GROUP Ages 10 to adult

POTENTIAL USES
course component
classroom
teacher education
community group

GOALS To introduce comets and the return of Halley's Comet.

SPECIFIC OBJECTIVES
1. Understand the nature of comets.
2. View recovery photo of Comet Halley and diagrams of the 6 spacecraft being sent to comets in 1985-86.

NATURE OF ACTIVITIES/CONTENT The kit contains 31 slides, a booklet with detailed captions, and a bibliography.

GENERAL DESCRIPTION/UNIQUE CHARACTERISTICS

COMPONENTS (instructor x student x )
31 slide set
16 page booklet
bibliography

INSTRUCTIONAL FORMAT
slide presentation
printed material

TIME FOR INSTRUCTION
open

EVALUATION OF MATERIALS

NUMBER OF TEST GROUPS ____
NUMBER OF SCHOOLS/INSTITUTIONS ____
TOTAL NUMBER OF STUDENTS INVOLVED ____
EVIDENCE OF EFFECTIVENESS

LOCAL REPRODUCTION LIMITATIONS Local reproduction privileges not granted.

HALLEY'S COMET
(Classroom activity guide)

SOURCE ADDRESS Sharon Hackley
PO Box 1291
Kingman, AZ 86402

COST $1.95

TARGET GROUP Age 8 to 12

POTENTIAL USES
classroom
unit component

GOAL Provide interdisciplinary activities for upper-elementary students.

SPECIFIC OBJECTIVE
1. Describe major events of Halley's Comet visit during the coming year.
2. Write poems, stories, and reports involving events relating to Halley's Comet.
3. Perform drawing, singing, and word find activities involving the comet.

NATURE OF ACTIVITIES/CONTENT The guide provides language arts activities related to the visit of Halley's Comet. A number of suggestions are given for poems, stories, and reports.

GENERAL DESCRIPTION/UNIQUE CHARACTERISTICS The guide illustrates a sample of the kinds of classroom activities that may be utilized to integrate astronomy with language arts experiences.

COMPONENTS (instructor x student x )
12 page teacher guide

INSTRUCTIONAL FORMAT
printed material

TIME FOR INSTRUCTION
open

EVALUATION OF MATERIALS

NUMBER OF TEST GROUPS 1
NUMBER OF SCHOOLS/INSTITUTIONS 1
TOTAL NUMBER OF STUDENTS INVOLVED 32
EVIDENCE OF EFFECTIVENESS Program adopted for all 5 schools in the Kingman District.

LOCAL REPRODUCTION LIMITATIONS Local reproduction privileges are granted for educational uses.

HALLEY'S COMET ACTIVITIES MANUAL
(Classroom activity guide)

SOURCE ADDRESS Sky Publishing Corp.
49 Bay State Road
Cambridge, MA 02238

COST $4.00

TARGET GROUP Ages 12 to adult

POTENTIAL USES
classroom
workshop
large group
teacher education

GOAL Provide background material and planned activities on comets, their orbits, historical information, and cultural context of their visits.

SPECIFIC OBJECTIVES
1. Explore history by means of time intervals between appearances of the comet.
2. Understand how to use sky charts and develop plotting and interpretive skills.
3. Analyze the data which led Halley to his prediction and construct a three-dimensional representation of the passage of the comet.
4. Determine techniques to measure locations and sizes of objects by using a yardstick crossbow and computer programs.

NATURE OF ACTIVITIES/CONTENT
Students are 1) taught the state of the world at past apparitions and during Dr. Halley's liftetime, 2) taught to use celestial charts and coordinates, 3)make a model of the Halley's comet's orbit and determine its properties, 4) plot the comet's position on charts and determine its position in the sky. Students may make a cross staff to measure angles in the sky as well as construct conic sections.

GENERAL DESCRIPTION/UNIQUE CHARACTERISTICS

COMPONENTS (instructor x student x )
48 page guide

INSTRUCTIONAL FORMAT
printed material

TIME FOR INSTRUCTION
12 sessions

EVALUATION OF MATERIALS

| | |
|---|---|
| NUMBER OF TEST GROUPS | 10 |
| NUMBER OF SCHOOLS/INSTITUTIONS | 6 |
| TOTAL NUMBER OF STUDENTS INVOLVED | 500 |

EVIDENCE OF EFFECTIVENESS Large numbers have been requested.

LOCAL REPRODUCTION LIMITATIONS Not available/local reproduction not permitted.

HALLEY'S COMET AND COMETS IN GENERAL
(12 Classroom activities)

SOURCE ADDRESS
Dennis Schatz, Associate Director
Pacific Science Center
200 Second Ave. N.
Seattle, WA 98109

COST $7.95+
$1 postage
and discounts
for 5+ copies

TARGET GROUP Ages 9 to 14

POTENTIAL USES
course component
teacher education
lab sessions
community groups

GOAL Understand the nature of comets and how to view Halley's Comet.

SPECIFIC OBJECTIVES
1. Examine comet photographs to understand the structure of comets.
2. Use a flip book to discover how comets move through space.
3. Make a model comet to understand the immensity of the comet's tail.
4. Use observation charts and make a Halley's Comet calender to effectively track and observe the comet as it approaches earth.
5. Make a Halley's Comet greeting card.

NATURE OF ACTIVITIES/CONTENT More than 12 learning activities to understand comets and specifically observe Halley's Comet. Examples are 1) match photographs of comets to description to learn basic traits of comets, 2) make model of a comet in the classroom to understand relative size, 3) use flip-book to understand motion of comets, etc.

GENERAL DESCRIPTION/UNIQUE CHARACTERISTICS A combination of information and challenging activities. The book gives history, lore, as well as the nature of comets. It describes international rendezvous of 5 space crafts with Halley's Comet. There is a teachering guide for parents, teachers, and group leaders. Bibliographical references are included.

COMPONENTS (instructor x student x )
40 page student guide
Simple materials required

INSTRUCTIONAL FORMAT
Printed materials.

TIME FOR INSTRUCTION
3-10 one-hour sessions

EVALUATION OF MATERIALS

NUMBER OF TEST GROUPS 3
NUMBER OF SCHOOLS/INSTITUTIONS 3
TOTAL NUMBER OF STUDENTS INVOLVED 150
EVIDENCE OF EFFECTIVENESS Written response from students and teachers. 5000 copies already distributed.

LOCAL REPRODUCTION LIMITATIONS Reproduction privileges are not granted. See exceptions in the material.

MR. HALLEY'S COMET
(Resource guide)

SOURCE ADDRESS Special Publication
National Science Teachers Assoc.
1742 Connecticut Ave., NW
Washington, DC 20009

COST $2.00+
$2 postage and handling

TARGET GROUP Ages 10 to 15

POTENTIAL USES
classroom
lab component
community groups
self-instruction

GOAL Provide basic information about the nature of a comet and how to view Halley's Comet 1985-86.

SPECIFIC OBJECTIVES
1. Describe what a comet is and what makes Halley's Comet special.
2. Understand the best time for viewing Halley's Comet and how to use charts depicting the comet's location.
3. Identify the best observing and photographic instruments for viewing Comet Halley.

NATURE OF ACTIVITIES/CONTENT An information pamphlet provided to aid students to view and understand Halley's Comet 1985-86.

GENERAL DESCRIPTION/UNIQUE CHARACTERISTICS It is an easy to use guide with starcharts along with fairly simple instructions on how to use them. Observation are depicted from December 15, 1985 till May 13, 1986 for viewing from the Northern and Southern U.S. latitudes.

COMPONENTS (instructor ___ stud nt _x_ )
32 page pamphlet

INSTRUCTIONAL FORMAT
printed materials

TIME FOR INSTRUCTION
open

EVALUATION OF MATERIALS

NUMBER OF TEST GROUPS ____
NUMBER OF SCHOOLS/INSTITUTIONS ____
TOTAL NUMBER OF STUDENTS INVOLVED ____
EVIDENCE OF EFFECTIVENESS

LOCAL REPRODUCTION LIMITATIONS Local reproduction privileges not granted.

THE RETURN OF HALLEY'S COMET
(Resource guide)

SOURCE ADDRESS Comet Halley Packet
Astronomical Society of Pacific
1290 24th Avenue
San Franciso, CA 94122

COST $4.00

TARGET GROUP Ages 15 to adult

POTENTIAL USES
classroom
lab component
community groups
self-instruction
teacher education

GOAL Provide both background information on comet science and comet lore and an observing guide for the return of Comet Halley.

SPECIFIC OBJECTIVES
1. Understand the nature of comets, their origin, and paths in the solar system.
2. Understand the historical impact of previous visits of Halley's comet.
3. Interpret graphs and charts depicting Halley 1985-86.
4. Provides guidelines for finding and observing Comet Halley.

NATURE OF ACTIVITIES/CONTENT An information packet is provided to aid the average person to view and understand Halley's Comet 1985-86.

GENERAL DESCRIPTION/UNIQUE CHARACTERISTICS It contains reprints from Mercury magazine and a reading list for Halley's Comet.

COMPONENTS (instructor x student x )
36 page pamphlet

INSTRUCTIONAL FORMAT
printed material

TIME FOR INSTRUCTION
open

EVALUATION OF MATERIALS

NUMBER OF TEST GROUPS ____
NUMBER OF SCHOOLS/INSTITUTIONS ____
TOTAL NUMBER OF STUDENTS INVOLVED ____
EVIDENCE OF EFFECTIVENESS

LOCAL REPRODUCTION LIMITATIONS Local reproduction privileges not granted.

# RESOURCE MATERIALS AND GUIDES

ANNOTATED BIBLIOGRAPHY ON PSEUDO-SCIENCE
(Classroom resource)

SOURCE ADDRESS Pseudoscience List
Astronomical Society of the Pacific
1290 24th Avenue
San Francisco, CA 94122

COST $1.00

TARGET GROUP Ages 12 to adult

POTENTIAL USES
teacher education
planning course or units
community groups
classroom

GOAL Introduce the reader to the various claims of 'paranormal' events and to provide references to nontechnical books and articles.

SPECIFIC OBJECTIVES
1. Provide a resource for planning astronomy lessons.
2. Provide students with sources for additional research.

NATURE OF ACTIVITIES/CONTENT A selected bibliography of printed materials for use in teaching astronomy courses in high school and college.

GENERAL DESCRIPTION/UNIQUE CHARACTERISTICS The index lists major articles, books, etc. written on the subject.

COMPONENTS (instructor x student ___ )
bibliography

INSTRUCTIONAL FORMAT
printed material

TIME FOR INSTRUCTION
open

EVALUATION OF MATERIALS

NUMBER OF TEST GROUPS ____
NUMBER OF SCHOOLS/INSTITUTIONS ____
TOTAL NUMBER OF STUDENTS INVOLVED ____
EVIDENCE OF EFFECTIVENESS

LOCAL REPRODUCTION LIMITATIONS Local reproduction privileges not granted.

ASTRONOMY AND COMPUTERS RESOURCE LIST
(Classroom resource)

SOURCE ADDRESS Computer List
Astronomical Society of the Pacific
1290 24th Avenue
San Francisco, CA 94122

COST $1.00

TARGET GROUP Ages 15 to adult

POTENTIAL USES
teacher education
workshop

GOAL Provide an annotated list of astronomical software.

SPECIFIC OBJECTIVES
1. Provide the teacher with a listing which contains a brief description of what the software does and the full address of the manufacturer.
2. Provide the teacher with a list of reference books for the astronomy classroom.

NATURE OF ACTIVITIES/CONTENT The annotated list includes 45 programs available on disk or cassette for such computers as Apple, IBM, Commodore, Atari, and TRS-80.

GENERAL DESCRIPTION/UNIQUE CHARACTERISTICS

COMPONENTS (instructor _x_ student ___ )
4 page annotated list

INSTRUCTIONAL FORMAT
printed material

TIME FOR INSTRUCTION
open

EVALUATION OF MATERIALS

NUMBER OF TEST GROUPS ____
NUMBER OF SCHOOLS/INSTITUTIONS ____
TOTAL NUMBER OF STUDENTS INVOLVED ____
EVIDENCE OF EFFECTIVENESS

LOCAL REPRODUCTION LIMITATIONS Local reproduction privileges not granted.

ASTRONOMY EDUCATION RESOURCES-BASIC MEDIA FOR PRESCHOOL THROUGH COLLEGE
(Classroom resource)

SOURCE ADDRESS Dennis W. Sunal
604 Allen Hall
West Virginia University
Morgantown, WV 26506

COST $1.50

TARGET GROUP Teachers

POTENTIAL USES
teacher education groups

GOAL Make available an annotated compilation of films for the astronomy educator.

SPECIFIC OBJECTIVES
1. Provide instructional information planning astronomy lessons useful for ages preschool through adult in a variety of settings.
2. Provide a listing of resources catagorized by student thinking level.

NATURE OF ACTIVITIES/CONTENT It is a resource listing for astronomy educators.

GENERAL DESCRIPTION/UNIQUE CHARACTERISTICS Each entry contains the following information in sequence: level, title, short abstract, film producer, length of running time, catalog number and source code, color or black and white, rental fee, and production date.

COMPONENTS (instructor _x_ student ___ )
12 page guide

INSTRUCTIONAL FORMAT
printed material

TIME FOR INSTRUCTION

EVALUATION OF MATERIALS

NUMBER OF TEST GROUPS ____
NUMBER OF SCHOOLS/INSTITUTIONS ____
TOTAL NUMBER OF STUDENTS INVOLVED ____
EVIDENCE OF EFFECTIVENESS

LOCAL REPRODUCTION LIMITATIONS Local reproduction privileges granted for educational use with acknowledgement and written notification.

ASTRONOMY MICROCOMPUTER GUIDE
(Classroom resource guide)

SOURCE ADDRESS John Mosley
Griffith Observatory
2800 East Observatory Rd.
Los Angeles, CA 90027

COST Self-addressed envelope with 2 stamps

TARGET GROUP Ages 14 to adult

COMPATABILITY
Many systems listed.

GOAL

SPECIFIC OBJECTIVES

NATURE OF ACTIVITIES/CONTENT

GENERAL DESCRIPTION
This list was compiled in May, 1985. It provides a resource for persons interested in software in the astronomy field. The list includes software for TRS-80, Commodore 64, Apple, IBM-PC, Timex-Sinclair, VIC-20, Atari, and Wang 128.

COMPONENTS (instructor ___ student ___ )

INSTRUCTIONAL FORMAT

TIME FOR INSTRUCTION

EVALUATION OF MATERIALS

NUMBER OF TEST GROUPS ____
NUMBER OF SCHOOLS/INSTITUTIONS ____
TOTAL NUMBER OF STUDENTS INVOLVED ____
EVIDENCE OF EFFECTIVENESS

LOCAL REPRODUCTION LIMITATIONS Local reproduction privileges granted for educational use.

ASTRONOMY NEWSLETTER FOR TEACHERS
(Classroom resource)

SOURCE ADDRESS Newsletter
Astronomical Society of the Pacific
1290 24 th Avenue
San Francisco, CA 94122

COST Free if requested on stationery.

TARGET GROUP Teachers

POTENTIAL USES

teacher education
course component

GOAL Provide a newsletter for teachers and librarians in grades 3 to 12 who would like to include more astronomy in their classrooms.

SPECIFIC OBJECTIVES

1. Provide short nontechnical articles on new developments in our exploration of the universe.
2. Provide practical classroom activities for teaching astronomy.
3. Provide specific suggestions for the best written and audio-visual resources on astronomical topics.

NATURE OF ACTIVITIES/CONTENT The newsletter is written for teachers and requires very little background in astronomy or science.

GENERAL DESCRIPTION/UNIQUE CHARACTERISTICS It is a quarterly newsletter provided free to teachers.

COMPONENTS (instructor _x_ student ___ )
4 page quarterly newsletter

INSTRUCTIONAL FORMAT
printed material

TIME FOR INSTRUCTION

EVALUATION OF MATERIALS

NUMBER OF TEST GROUPS ____
NUMBER OF SCHOOLS/INSTITUTIONS ____
TOTAL NUMBER OF STUDENTS INVOLVED ____
EVIDENCE OF EFFECTIVENESS 4500 teachers now receive it.

LOCAL REPRODUCTION LIMITATIONS Local reproduction privileges not granted.

DISPELLING THE MYTHS ABOUT UNIDENTIFIED FLYING OBJECTS (UFO'S)
(Bibliography)

SOURCE ADDRESS
Robert R. Young
Education Chairman
Astronomical Society of Harrisburg
329 S. Front St.
Harrisburg, PA 17104

COST Self-addressed stamped envelope

TARGET GROUP Ages 10 to adult

POTENTIAL USES
classroom
unit component

GOAL Provide teachers, librarians, and interested people with available sources of scientific information about the subject of UFO's.

SPECIFIC OBJECTIVES
1. Provide a list of commonly seen natural or man-made phenomena which are mistaken for something extraordinary.
2. Provide sources for indepth reading.

NATURE OF ACTIVITIES/CONTENT A bibliography of available books and articles presenting scientific information about the UFO myth, and other related pseudo-scientific subjects (Bigfoot, Bermuda Triangle, etc.) and a list of unusual 'identified' phenomena seen locally by experienced skywatchers.

GENERAL DESCRIPTION/UNIQUE CHARACTERISTICS It is bibliography of books and articles.

COMPONENTS (instructor x student ___ )
2 page bibliography

INSTRUCTIONAL FORMAT
printed materials

TIME FOR INSTRUCTION

EVALUATION OF MATERIALS

NUMBER OF TEST GROUPS ____
NUMBER OF SCHOOLS/INSTITUTIONS ____
TOTAL NUMBER OF STUDENTS INVOLVED ____
EVIDENCE OF EFFECTIVENESS

LOCAL REPRODUCTION LIMITATIONS Local reproduction privileges granted for educational uses.

EXEMPLARY ASTRONOMY SOFTWARE
(Classroom resource)

SOURCE ADDRESS Russ Harding
187 Noroton Avenue
Darien, CT 06820

COST $1.00 and a self-addressed envelope

TARGET GROUP Teachers

POTENTIAL USES

teacher education workshop

GOAL Provide a description and evaluation of selected astronomy software.

SPECIFIC OBJECTIVES
1. Provide the teacher with evaluations of software packages.
2. Provide the teacher with previews and helps eliminate wasteful purchases of software in elementary school to college.

NATURE OF ACTIVITIES/CONTENT It is an indepth preview of selected current software packages by the author and others in the field of astronomy.

GENERAL DESCRIPTION/UNIQUE CHARACTERISTICS A careful analysis of software which provides the teacher with a true picture of how the package really applies what it claims to do. The software reviewed is for elementary through college. Requests for specific areas are preferred.

COMPONENTS (instructor _x_ student ___ )
Software evaluations

INSTRUCTIONAL FORMAT
printed material

TIME FOR INSTRUCTION

EVALUATION OF MATERIALS

NUMBER OF TEST GROUPS ____
NUMBER OF SCHOOLS/INSTITUTIONS ____
TOTAL NUMBER OF STUDENTS INVOLVED ____
EVIDENCE OF EFFECTIVENESS

LOCAL REPRODUCTION LIMITATIONS Local reproduction privileges granted for educational use.

GUIDE TO SOFTWARE SELECTION RESOURCES: PART FOUR
(Classroom resource guide)

SOURCE ADDRESS Northeast Regional Exchange, Inc.
34 Littleton Rd.
Chelmsford, MA 01824

COST Free if requested on letterhead.

TARGET GROUP Teachers

POTENTIAL USES

GOAL

SPECIFIC OBJECTIVES

NATURE OF ACTIVITIES/CONTENT

GENERAL DESCRIPTION

It is a resource for teachers and administrators to provide information on resources and tools for locating software and assessing its appropriateness for various instructional applications. The purpose is to provide a means through which teachers can make decisions about appropriateness and quality within the context of their curriculum and instructional needs.

COMPONENTS (instructor ___ student ___ )
resource guide

INSTRUCTIONAL FORMAT

TIME FOR INSTRUCTION

EVALUATION OF MATERIALS

NUMBER OF TEST GROUPS ____
NUMBER OF SCHOOLS/INSTITUTIONS ____
TOTAL NUMBER OF STUDENTS INVOLVED ____
EVIDENCE OF EFFECTIVENESS

LOCAL REPRODUCTION LIMITATIONS

INFORMATION PACKET ON QUASARS
(Classroom resource)

SOURCE ADDRESS Quasars
Astronomical Society of the Pacific
1290 24 th Avenue
San Francisco, CA 94122

COST $2.00

TARGET GROUP Ages 15 to adult

POTENTIAL USES
teacher education
planning course or units
community groups
classroom
self-instruction

GOAL Provide an introduction to quasars.

SPECIFIC OBJECTIVES
1. Provide an overview of observed quasars properties.
2. Provide information to support the idea that quasars are imbedded in host galaxies.
3. Provides information for alternative descriptions of the quasars' power source.

NATURE OF ACTIVITIES/CONTENT It is a nontechnical information packet which has just been published. The articles in the packet describe why astronomers and laypeople have found the quasars phenomenon so fascinating.

GENERAL DESCRIPTION/UNIQUE CHARACTERISTICS It contains five articles on the subject of quasars. Also included, is an extensive bibliography of further reliable reading materials about quasars.

COMPONENTS (instructor x student x )
20 page guide
bibliography

INSTRUCTIONAL FORMAT
printed materials

TIME FOR INSTRUCTION
open

EVALUATION OF MATERIALS

NUMBER OF TEST GROUPS ____
NUMBER OF SCHOOLS/INSTITUTIONS ____
TOTAL NUMBER OF STUDENTS INVOLVED ____
EVIDENCE OF EFFECTIVENESS

LOCAL REPRODUCTION LIMITATIONS Local reproduction privileges not granted

SELECTED SCIENCE OBJECTIVES FOR AN ASTRONOMY CURRICULUM
(Classroom resource)

SOURCE ADDRESS
Dennis W. Sunal
604 Allen Hall
West Virginia University
Morgantown, WV 26506

COST $1.00 and a self-addressed envelope

TARGET GROUP Teachers

POTENTIAL USES
teacher education
planning course or units
community groups

GOAL Provide objectives for teaching astronomy grouped in a way that characterizes level of student thought.

SPECIFIC OBJECTIVES
1. Describe general objective catergories for preoperational, transition, concrete-operational, and transition to formal student thought levels.
2. Describe specific objectives for planning activities in each general content catagory.

NATURE OF ACTIVITIES/CONTENT A resource for planning astronomy units and courses.

GENERAL DESCRIPTION/UNIQUE CHARACTERISTICS It is a listing of astronomy objectives by student thought level. An earlier version of the listing can be found in the introduction of the Astronomy Education Materials Resource Guide, 1985.

COMPONENTS (instructor x student ___ )
8 page resource guide
list of resources included

INSTRUCTIONAL FORMAT
printed materials

TIME FOR INSTRUCTION
open

EVALUATION OF MATERIALS

| | |
|---|---|
| NUMBER OF TEST GROUPS | 4 |
| NUMBER OF SCHOOLS/INSTITUTIONS | 1 |
| TOTAL NUMBER OF STUDENTS INVOLVED | 150 |

EVIDENCE OF EFFECTIVENESS

LOCAL REPRODUCTION LIMITATIONS Local reproduction privileges granted for educational uses with acknowledgement and notification.

SELECTING YOUR FIRST TELESCOPE
(Information guide)

SOURCE ADDRESS Astronomical Society of the Pacific
Telescope Guide Department
1290 24th Ave.
San Francisco, CA 94122

COST $2.00

TARGET GROUP Ages 12 to adult

POTENTIAL USES
classroom
workshop
course component
self-instructional
teacher educational

GOAL Provide an introduction to selecting and using a telescope.

SPECIFIC OBJECTIVES
1. Understand telescopes and how they work.
2. Identify different types of telescopes.
3. Plan for selection of a telescope.

NATURE OF ACTIVITIES/CONTENT A self-study pamphlet with explanations, questions, bibliography, and source lists.

GENERAL DESCRIPTION/UNIQUE CHARACTERISTICS

COMPONENTS (instructor x student x )
12 page pamphlet

INSTRUCTIONAL FORMAT
printed materials

TIME FOR INSTRUCTION
open

EVALUATION OF MATERIALS

NUMBER OF TEST GROUPS ____
NUMBER OF SCHOOLS/INSTITUTIONS ____
TOTAL NUMBER OF STUDENTS INVOLVED ____
EVIDENCE OF EFFECTIVENESS Reviewed by a panel of professional and amateur astronomers.

LOCAL REPRODUCTION LIMITATIONS Local reproduction privileges not granted.

SKY CALENDAR
(Monthly resource publication)

SOURCE ADDRESS Sky Calendar
Abrams Planetarium
Michigan State University
East Lansing, MI 48824

COST $5.00/year starting anytime, or send $1 and Self-addressed stamped envelope for sample set

DEVELOPER Robert C. Victor

POTENTIAL USES
classroom
self-instruction
teacher education

TARGET GROUP Ages 10 to adult

GOAL Promote direct observation and understanding of the changing appearance of the night sky.

SPECIFIC OBJECTIVES
1. Monthly calender illustrates:
   a) Moon's phases and motion past planets and bright stars
   b) Positions and motions of planets
   c) Sky phenomena illustrated day by day
   d) Observing activities.
2. Simplified star map of the month's evening sky
3. Occasional extra sheet gives details of special events, such as eclipses and Comet Halley.

NATURE OF ACTIVITIES/CONTENT An illustrated monthly calendar of sky phenemena with suggestions for observing activities and an evening star chart.

GENERAL DESCRIPTION/UNIQUE CHARACTERISTICS A unique and effective way to develop interest in observational astronomy and a valuable resource for teachers in planning lessons.

COMPONENTS (instructor x student x )
Separate monthly sheets printed on both sides; mailed quarterly.

INSTRUCTIONAL FORMAT
printed calenders and charts

TIME FOR INSTRUCTION
open

EVALUATION OF MATERIALS

NUMBER OF TEST GROUPS 1000's
NUMBER OF SCHOOLS/INSTITUTIONS 1000's
TOTAL NUMBER OF STUDENTS INVOLVED 10's of thousands
EVIDENCE OF EFFECTIVENESS Used by 10's of thousands with continuous favorable letters and reviews.

LOCAL REPRODUCTION LIMITATIONS Request for reproduction policy must be accompanied by a self-addressed stamped envelope.

STELLAR HANDBOOK
(Resource handbook)

SOURCE ADDRESS Astronomical League Book Service
1001 S. Cornelia Street
Sioux City, Iowa 51106

COST $3.00

POTENTIAL USES
classroom
observation laboratory
community groups

TARGET GROUP Ages 12 to adult

GOAL Provide a basic catalog of information on stars and galaxies for the sky observer.

SPECIFIC OBJECTIVES
1. Provides information, positions, and background on the brightest stars, nearest stars, variables, doubles, nebulae, star clusters, Messier objects, galaxies, and galaxy clusters.
2. Provides useful information on astronomical units, conversions, coordinate systems, and a precession table.

NATURE OF ACTIVITIES/CONTENT It is an inexpensive but valuable catalog for teachers and students. Many graphs and charts are available to aid the observer.

GENERAL DESCRIPTION/UNIQUE CHARACTERISTICS

COMPONENTS (instructor x student x )
60 page resource guide

INSTRUCTIONAL FORMAT
printed material

TIME FOR INSTRUCTION
open

EVALUATION OF MATERIALS

| | |
|---|---|
| NUMBER OF TEST GROUPS | many |
| NUMBER OF SCHOOLS/INSTITUTIONS | many |
| TOTAL NUMBER OF STUDENTS INVOLVED | |
| EVIDENCE OF EFFECTIVENESS | |

LOCAL REPRODUCTION LIMITATIONS Request for reproduction should be addressed to the above address stating reason for reproduction.

SUBJECT INDEX TO ASTRONOMY ARTICLES IN MERCURY MAGAZINE
(Classroom resource)

SOURCE ADDRESS Mercury Index
Astronomical Society of the Pacific
1290 24th Avenue
San Francisco, CA 94122

COST self-addressed envelope with 2 first class stamps

TARGET GROUP Ages 14 to adult

POTENTIAL USES
teacher education
planning course or units
community groups
classroom

GOAL Provide a reference to authoritative non-technical articles in astronomy for teachers and older students.

SPECIFIC OBJECTIVES
1. Provide a resource for planning astronomy lessons.
2. Provide students with sources for additional research.

NATURE OF ACTIVITIES/CONTENT A selected bibliography of printed astronomy materials for teaching astronomy courses in high school and college.

GENERAL DESCRIPTION/UNIQUE CHARACTERISTICS The index lists the major articles which appeared in the first ten volumes of MERCURY . Many articles are cross-referenced under several headings for convenience in locating them.

COMPONENTS (instructor x student ___ )
6 page bibliography

INSTRUCTIONAL FORMAT
printed material

TIME FOR INSTRUCTION
open

EVALUATION OF MATERIALS

NUMBER OF TEST GROUPS ___
NUMBER OF SCHOOLS/INSTITUTIONS ___
TOTAL NUMBER OF STUDENTS INVOLVED ___
EVIDENCE OF EFFECTIVENESS

LOCAL REPRODUCTION LIMITATIONS Local reproduction privileges not granted.

SUBJECT INDEX TO ASTRONOMY ARTICLES IN SCIENTIFIC AMERICAN
(Classroom resource)

SOURCE ADDRESS Astronomy Index
Astronomical Society of the Pacific
1290 24th Avenue
San Francisco, CA 94122

COST Self-addressed stamped envelope+ postage for 2 oz.

TARGET GROUP Ages 15 to adult

POTENTIAL USES
teacher education
planning course or units
community groups
classroom

GOAL Provide a reference to authoritative non-technical articles in astronomy for teachers and older students.

SPECIFIC OBJECTIVES
1. Provide a resource for planning astronomy lessons.
2. Provide students with sources for additional research.

NATURE OF ACTIVITIES/CONTENT A selected bibliography of printed astronomy articles for use in planning astronomy courses in high school and college.

GENERAL DESCRIPTION/UNIQUE CHARACTERISTICS The index lists the major articles which appeared in SCIENTIFIC AMERICAN . It is a complete subject index to astronomy articles between 1960 to 1981.

COMPONENTS (instructor _x_ student ___ )
bibliography

INSTRUCTIONAL FORMAT
printed material

TIME FOR INSTRUCTION
open

EVALUATION OF MATERIALS

NUMBER OF TEST GROUPS ___
NUMBER OF SCHOOLS/INSTITUTIONS ___
TOTAL NUMBER OF STUDENTS INVOLVED ___
EVIDENCE OF EFFECTIVENESS

LOCAL REPRODUCTION LIMITATIONS Local reproduction privileges not granted.

TEACHING ASTRONOMY WITH NASA MATERIALS
(Classroom resources)

1. Activities in Planetary Geology for the Physical and Earth Sciences
2. A Primer in Lunar Geology
3. NASA, The First 25 Years--1958-1983
4. NSTA-NASA 84-85
5. NASA FACTS
6. Space Telescope
7. 1976, The Supernova
8. 1976, Chemistry Between the Stars
9. 1976, Extrogalactic Astronomy
10. 1976, What's New on the Moon
11. 1977, Mars: The Viking Discoveries
12. 1977, Apollo-Soyuz Pamphlet #9-General Science
13. 1977, Apollo-Soyuz Pamphlet #3-Sun Stars; In Between
14. 1973, Sky Lab Experiments Vol. 1- Physical Science, Solar Astronomy
15. 1977-84, Spinoff, An Annual Report
16. 1982, Space Telescope
17. Quarterly, Report to Education

SOURCE ADDRESS National Aeronautics and Space Admin.
Division of Public Affairs
Washington, DC 20546

COST one copy
free upon request

POTENTIAL USES
classroom
groups
self-instruction

TARGET GROUP Ages 12 to adult

GOAL Inform educators of new advancements in astronomy.

GENERAL DESCRIPTION/UNIQUE CHARACTERISTICS All materials are excellent resouces for classroom use. Numbers one and two are excellent resources for teaching astronomy.

LOCAL REPRODUCTION LIMITATIONS Local reproduction privileges not granted.

# EDUCATIONAL RESOURCES INFORMATION CENTER

# ASTRONOMY ITEMS IN DATA BASE 1966-1985

## ASTRONOMY EDUCATION MATERIALS FROM THE EDUCATIONAL RESOURCES INFORMATION CENTER*

The Astronomy Education Materials Network focuses on materials currently being developed or are continuously being used in instructional settings. Older materials are generally not accessed through the AEMN Network.

The Educational Resources Information Center (ERIC) supported by the National Institute of Education has been receiving and storing educational materials since 1966. Within the ERIC system are astronomy materials which relate to the same goal and purpose as the AEMN Network. Some of these astronomy items are currently being used in instructional settings. Most may be unknown to today's astronomy teachers. A rediscovery of some of the best materials may provide astronomy teachers with just that set of materials or curriculum ideas which might be needed.

The following selection of astronomy materials from the ERIC system were selected using a broad set of descriptors. The descriptors were chosen to obtain a large number of entries related to astronomy curriculum and instruction, pre-school through college.

The search of the ERIC computer database, 1966-present, was made using the following descriptors.

| | Descriptor | No. of items in Database |
|---|---|---|
| 1. | Astronomy | 1113 |
| 2. | Education/Astronomy | 391 |
| 3. | Instructional Materials | 27515 |
| 4. | Lesson Plans | 2744 |
| 5. | Laboratory Manuals | 226 |
| 6. | Laboratory Experiments | 2096 |
| 7. | Laboratory Procedures | 2075 |
| 8. | Learning Modules | 3670 |
| 9. | Learning Strategies | 535 |
| 10. | Computer Assisted Instruction | 7354 |
| 11. | Educational Media | 6135 |
| 12. | Instructional Films | 1075 |
| | Intersect 1 with 2-12 | 129 (Items included) |

## HOW TO OBTAIN ERIC MATERIALS

The ERIC database consists of two main files: Resources in Education (RIE) which is concerned with significant unpublished education reports and projects; and Current Index to Journals in Education (CIJE), an index of more than 700 periodicals. CIJE materials begin with a CJ identification number. CJ items can be obtained from journals stored at your nearest library or through inter-library loan of journals.

* Reproduced by permission.

RIE unpublished materials begin with an ED identification number. ED items can be obtained in microfiche or paper copy form from the Document Reproduction Service, 3900 Wheeler Ave., Alexandria, Va. 22304. An order form is included here to help you purchase the materials. Throughout the United States and abroad, complete collections of RIE materials on microfiche are stored at many large libraries. You may want to view the complete documents at these locations rather than purchase them. In either case, RIE and CIJE astronomy materials are available to most astronomy teachers.

## SELECTING ERIC MATERIALS FROM RECORDS

In order to help you to select appropriate astronomy materials, a complete abstract and list of descriptors is provided with each data field. Identify materials first by looking at the title, then, if interested, by reading the descriptors. If still interested, read through the entire abstract. A complete "sample" record identifying the major parts follows. For more complete information on the ERIC system check with your local library or write ERIC. Remember, to obtain ERIC materials write to the Document Reproduction Service not to the Director of the AFMN Network.

### SAMPLE RECORD

The positions of the key fields are shown in the following sample record.

```
AN,CH  ED178312  SE029137
TI       Guidelines for Teaching Mathematics K-12.
AU       Flax, Rosabel; And Others
CS       Kansas State Dept. of Education, Topeka. Div. of
       Education Services
PY       Jun 1979   91p.; Best copy available
         EDRS Price - MF01/PC04 Plus Postage
LA       Language: English
DT       Document Type: TEACHING GUIDE (052)
CP       Geographic Source: U.S.; Kansas
JA       Journal Announcement: RIEMAR80
GL       Government: State
AB       This guide is intended to provide a basic outline for
       developing local mathematics programs. It was developed
       to give Kansas mathematics teachers from grades K-12
       minimal sequential experiences in implementing the
       skills, values, and concepts of the mathematics
       program. The guide contains objectives, a checklist of
       topics appropriate for each grade level, and a human
       resources guide which provides the names of individuals
       willing to serve as technical assistants to local
       school districts. (MK)
DE       Descriptors: *Directories; *Elementary School
       Mathematics; Elementary Secondary Education; Guidelines
       ; *Mathematics Curriculum; *Resource Teachers;
       *Secondary School Mathematics; *State Curriculum Guides
       ; State Departments of Education
ID       Identifiers: *Kansas
```

### Key to Data Fields

| | |
|---|---|
| AB | Abstract |
| AN | Clearinghouse Number |
| AU | Author |
| CH | Clearinghouse Code |
| CN | Contract/Grant Number |
| CP | Country of Publication |
| CS | Corporate Source |
| DE | Descriptor |
| DT | Document Type |
| GL | Government Level |
| ID | Identifier |
| JA | Journal Announcement |
| JN | Journal Name |
| LA | Language |
| PN | Bureau/Project Number |
| PY | Publication Year |
| RN | Report Number |
| SP | Sponsoring Agency |
| TI | Title |

# HOW TO ORDER ERIC DOCUMENTS

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Revised January 1985

**DIALOG File 1: ERIC - 66-85/JUN**

ED253423 SE045390
**Astronomy Activities.**
Greenstone, Sid
Manitoba Dept. of Education, Winnipeg.
[1984 118p.; Booklet was designed to be used in conjunction with a teacher workshop on astronomy.
EDRS Price - MF01/PC05 Plus Postage.
Language: English
Document Type: TEACHING GUIDE (052); GENERAL REFERENCE (130)
Geographic Source: Canada; Manitoba
Journal Announcement: RIEJUN85
Government: Foreign
Target Audience: Teachers; Practitioners
This document consists of activities and references for teaching astronomy. The activities (which include objectives, list of materials needed, and procedures) focus on: observing the Big Dipper and locating the North Star; examining the Big Dipper's stars; making and using an astrolabe; examining retrograde motion of Mars; measuring the Sun's diameter; finding the Sun's altitude and azimuth; observing sunspots; examining sunspot numbers over time; classifying stars; using a model to demonstrate the expanding universe; and making a moon phase model. The references include: a list of suppliers for audio-visual aids used in teaching astronomy; descriptions (and sources) of star charts and telescopes; an annotated list of astronomy periodicals; a list of professional astronomy organizations; articles by John Percy (including "Astronomy in the Classroom--Some New Resource Material," "Astronomy in Your Classroom", "Education in Astronomy: A Review," and "The Teaching of Astronomy in Canadian Schools"; several additional articles, including "Readily Observable Phenomena" by Dave Berryman, "The Mysterious Satellites of Saturn" and "Jupital Watch Continues--Jupiter Revealed" by Chandra Madhosingh, and "How to See the End of Night as the World Turns" by Allan Wooton; sky charts; a description of teaching styles related to astrological signs; and other materials. (JN)
Descriptors: *Astronomy; *Audiovisual Aids; Foreign Countries; *Instructional Materials; Resource Materials; *Science Activities; Science Education; *Science Instruction; Secondary Education; *Secondary School Science
Identifiers: *Manitoba; Star Charts; Telescopes

ED242474 RC014710
**Activities for Studying Heavenly Bodies. Outdoor Education Series. Bulletin No. 247-M.**
Montgomery County Public Schools, Rockville, Md.
1979 36p.
EDRS Price - MF01/PC02 Plus Postage.
Language: English
Document Type: TEACHING GUIDE (052)
Geographic Source: U.S.; Maryland
Journal Announcement: RIEAUG84
Target Audience: Teachers
This teacher guide for the astronomy unit of an outdoor education program consists of a series of performance objectives, intended to provide interesting, hands-on activities, involving interdisciplinary skills, that augment commitments of the mathematics, sciences, and social studies program of the Montgomery County (Maryland) Public Schools. Each activity is arranged sequentially according to the skills involved and outlines specific objectives, procedures, materials required, special considerations, and evaluation techniques. The 12 daytime activities are determining time with a shadow stick, making and using a sundial, finding direction without a compass, using a watch to locate north, measuring angles with fists, measuring and locating sky objects on the azimuth, making a simple astrolabe, measuring objects above the azimuth, using an astrolabe to measure the angle of the sun's rays, determining the "altazimuth" of objects, making a model of our solar system, and constructing and using a spectroscope. The five suggested nighttime astronomy activities are determining cardinal direction, using an astrolabe to measure the altitude of stars, observing apparent movement of stars, photographing star trails, observing meteors, and locating Polaris, Ursa Major, Ursa Minor, and Cassiopeia. Glossaries of stars, constellations, and terms are included, as is a bibliography. (NEC)
Descriptors: Activity Units; *Astronomy; *Behavioral Objectives; Elementary Secondary Education; Experiential Learning; Interdisciplinary Approach; Learning Activities; Learning Modules; *Outdoor Education; *Science Activities; Science Education; Units of Study
Identifiers: *Montgomery County Public Schools MD

ED239925 SE044113
**Stars and Star Myths.**
Eason, Oliver
Area Education Agency 7, Cedar Falls, IA.
[1980 100p.; Constellation charts on pages 80-93 may not reproduce well.
EDRS Price - MF01/PC04 Plus Postage.
Language: English
Document Type: INSTRUCTIONAL MATERIAL (051); TEACHING GUIDE (052)
Geographic Source: U.S.; Iowa
Journal Announcement: RIEJUN84
Target Audience: Students; Teachers
Myths and tales from around the world about constellations and facts about stars in the constellations are presented. Most of the stories are from Greek and Roman mythology; however, a few Chinese, Japanese, Polynesian, Arabian, Jewish, and American Indian tales are also included. Following an introduction, myths are presented for the following 32 constellations which include the 12 signs of the zodiac: Andromeda, Aquarius, Aquila, Aries, Auriga, Bootes, Cancer, Canis Major, Canis Minor, Capricornus, Cassiopeia, Cepheus, Cetus, Corvus, Cygnus, Draco, Gemini, Hercules, Leo, Lepus, Libra, Lyra, Orion, Pegasus, Perseus, Pisces, Sagittarius, Scorpius, Taurus, Ursa Major, Ursa Minor, and Virgo. Many of the constellations are described in more than one story. Two
(cont. next page)

DIALOG File 1: ERIC - 66-85/JUN

tests with answer keys are included along with a pronunciation guide for the names of the constellations. This document is part of a collection of materials from the Iowa Area Education Agency 7 Teacher Center project. (DC)

Descriptors: *Astronomy; Elementary Secondary Education; Fables; Folk Culture; Greek Literature; Instructional Materials; Latin Literature; *Mythology

Identifiers: *Constellations; PF Project; *Stars

ED219280 SE038787

**Workbook for Naval Science 3: An Illustrated Workbook for the NJROTC Student. Focus on the Trained Person. Technical Report 124.**

Omans, S. E.; And Others

University of Central Florida, Orlando.

May 1982 348p.

Sponsoring Agency: Naval Training Analysis and Evaluation Group, Orlando, Fla.

Grant No.: N61339-79-D-0105

EDRS Price - MF01/PC14 Plus Postage.

Language: English

Document Type: INSTRUCTIONAL MATERIAL (051)

Geographic Source: U.S.; Florida

Journal Announcement: RIEDEC82

Government: Federal

This workbook (first in a series of three) supplements the textbook of the third year Naval Junior Reserve Officers Training Corps (NJROTC) program and is designed for NJROTC students who do not have the reading skills necessary to fully benefit from the regular curriculum materials. The workbook is written at the eighth-grade readability level as determined by a Computer Readability Editing System analysis. In addition to its use in the NJROTC program, the workbook may be useful in several remedial programs such as Academic Remedial Training (ART) and the Verbal Skills Curriculum, both of which are offered at each of the three Recruit Training Commands to recruits deficient in reading or oral English skills. Topics in the workbook include naval history (1920-1945), leadership characteristics, meteorology, astronomy, and introductory electricity. Exercises include vocabulary development, matching, concept application, and extending learning activities. (Author/JN)

Descriptors: Astronomy; Electricity; High Schools; Instructional Materials; *Leadership; Meteorology; Military Science; *Military Training; *Physical Sciences; *Remedial Reading; *Secondary School Science; Workbooks

Identifiers: Naval History; *Naval Junior Reserve Officers Training Corps

ED216929 SE038133

**Drifting Continents and Wandering Poles. Crustal Evolution Education Project. Teacher's Guide and Student Investigation.**

Stoever, Edward C., Jr.

National Association of Geology Teachers.

1979 33p.

Sponsoring Agency: National Science Foundation, Washington, D.C.

Grant No.: SED-75-20151; SED-77-08539; SED-78-25104

Report No.: CEEP-MOD-WA2-2-3; ISBN-0-89873-010-4; ISBN-0-89873-011-2

Available from: Ward's Natural Science Establishment, Inc., P.O. Box 1712, Rochester, NY 14603 (or P.O. Box 1749, Monterey, CA 93940.)

EDRS Price - MF01 Plus Postage. PC Not Available from EDRS.

Language: English

Document Type: INSTRUCTIONAL MATERIAL (051); TEACHING GUIDE (052)

Geographic Source: U.S.; New York

Journal Announcement: RIEOCT82

Target Audience: Practitioners; Students

Crustal Evolution Education Project (CEEP) modules were designed to: (1) provide students with the methods and results of continuing investigations into the composition, history, and processes of the earth's crust and the application of this knowledge to man's activities and (2) to be used by teachers with little or no previous background in the modern theories of sea-floor spreading, continental drift, and plate tectonics. Each module consists of two booklets: a teacher's guide and student investigation. The teacher's guide contains all of the information present in the student investigation booklet as well as: (1) a general introduction; (2) prerequisite student background; (3) objectives; (4) list of required materials; (5) background information; (6) suggested approach; (7) procedure, recommending four 45-minute class periods required; (8) summary questions (with answers); (9) extension activities; and (10) list of references. Activities in this module include describing the relationship between north geographic and north magnetic poles and how this may vary in space and time, demonstrating the principle of a gyroscope and explaining how it relates to the earth, plotting positions and drawing a curve showing possible locations of the north geographic pole in the past, and telling how polar wandering might be used to explain continental movements. (Author/JN)

Descriptors: Astronomy; *Earth Science; *Geographic Location; Geology; Instructional Materials; Physical Geography; *Science Activities; *Science Course Improvement Projects; Science Curriculum; Science Education; Science Instruction; Secondary Education; *Secondary School Science; Teaching Guides; Teaching Methods

Identifiers: Continental Drift; *Crustal Evolution Education Project; National Science Foundation; *Plate Tectonics; Solar System

ED216524 FL012894

**Star Trek with Latin. Teacher's Guide. Tentative Edition.**

Masciantonio, Rudolph; And Others

Philadelphia School District, Pa. Office of Curriculum and Instruction.

(cont. next page)

DIALOG File 1: ERIC - 66-85/JUN

1982 55p.
EDRS Price - MF01/PC03 Plus Postage.
Language: English; Latin
Document Type: TEACHING GUIDE (052)
Geographic Source: U.S.; Pennsylvania
Journal Announcement: RIEOCT82
Government: State
Target Audience: Practitioners
The purpose of this guide is to assist Latin and English teachers with some background in Latin to expand the English vocabulary and reading skills of students through the study of Latin roots, prefixes, and suffixes. The introductory material in the guide provides general notes on the teaching of Latin in the Philadelphia School District, suggestions for scheduling and staffing the Latin classes, an outline of the organization of each lesson, some general hints to the teacher, and an overview of the material to be taught in the unit. The 13 lessons are designed also to familiarize the students with aspects of classical culture, specifically Latin utterances connected with the signs of the Zodiac, and the mythological sources of scientific information related to the Zodiac. Elements of basic Latin grammar, particularly the structural concept of subject-object-verb, and vocabulary building exercises are introduced in an audiolingual approach. Each lesson details the objectives, and includes class activities, review exercises, explanations, and word games. The final section of the guide consists of a number of pen-and-ink drawings suitable for mounting. (AMH)
Descriptors: *Astronomy; Audiolingual Methods; Cultural Awareness; Elementary Secondary Education; Etymology; *Latin; Lesson Plans; *Mythology; *Second Language Instruction; *Sentence Structure; Teaching Guides; *Word Study Skills

ED207807 SE035500
**Velocity Space and the Geometry of Planetary Orbits. Artificial Intelligence Memo No. 320.**
Abelson, Harold; And Others
Massachusetts Inst. of Tech., Cambridge. Artificial Intelligence Lab.
Dec 1974 59p.
Sponsoring Agency: National Science Foundation, Washington, D.C.
Grant No.: NSF-ED-40708-X
Report No.: LOGO-15
Available from: Artificial Intelligence Lab., 545 Technology Square, Rm. 338, Cambridge, MA 02139 ($1.75).
EDRS Price - MF01/PC03 Plus Postage.
Language: English
Document Type: TEACHING GUIDE (052)
Geographic Source: U.S.; Massachusetts
Journal Announcement: RIEFEB82
Target Audience: Practitioners
An approach to orbital mechanics, which is accessible to beginning physics students and presupposes no knowledge of calculus, is presented. A theory of orbits is developed for the inverse-square central force law which differs considerably from the usual deductive approach. This document begins with qualitative aspects of solutions, and leads to a number of geometrically realizable physical invariants of the orbits. Consequently, most of the theorems rely only on simple geometrical relationships. Despite its simplicity, this planetary geometry is powerful enough to treat a wide range of perturbations with relative ease. It is felt that this treatment provides a better view of "what doing physics is really like" than the standard route via algebraic manipulations. The document concludes with suggestions for further research into the geometry of planetary orbits. (MP)
Descriptors: Astronomy; *Geometric Concepts; Instructional Materials; *Mathematical Applications; Mathematical Concepts; *Physics; *Science Instruction; Secondary Education; *Secondary School Science; Supplementary Reading Materials
Identifiers: *Orbital Mechanics

ED199062 SE034287
**Astronomy Activities for the Classroom.**
Cain, Peggy W.; Welch, Daniel W.
South Carolina State Dept. of Education, Columbia.
[1980 35p.
EDRS Price - MF01/PC02 Plus Postage.
Language: English
Document Type: TEACHING GUIDE (052)
Geographic Source: U.S.; South Carolina
Journal Announcement: RIEJUL81
Government: State
Target Audience: Practitioners
Presented are middle school level, activity-oriented astronomy activities developed as a result of an earth science workshop for teachers. Topics include: (1) sun and moon position and measurement; (2) daily, yearly, and seasonal changes in the sun's position; (3) shapes and positions of planetary orbits; (4) eclipses; (5) properties of light; (6) atmospheric pressure; and (7) characteristics of pinholes, lenses and mirrors. (DS)
Descriptors: *Astronomy; *Demonstrations (Educational); Earth Science; *Instructional Materials; Physical Sciences; *Science Activities; Science Curriculum; Science Education; *Science Instruction; Secondary Education; *Secondary School Science; Space Sciences

ED190371 SE031315
**Probing the Natural World, Level III, Record Book, Teacher's Edition: In Orbit. Intermediate Science Curriculum Study.**
Bonar, John R., Ed.; Hathway, James A., Ed.
Florida State Univ., Tallahassee. Dept. of Science Education.
1972 55p.; For related documents, see SE 031 300-330, ED 035 559-560, ED 049 032, and ED 052 940. Contains colored graphs and print which may not reproduce well.
Sponsoring Agency: National Science Foundation, Washington,
(cont. next page)



002758

DIALOG INFORMATION SERVICES, INC.

**DIALOG File 1: ERIC - 66-85/JUN**

D.C.; Office of Education (DHEW), Washington, D.C.
EDRS Price - MF01/PC03 Plus Postage.
Language: English
Document Type: TEACHING GUIDE (052)
Geographic Source: U.S.; Florida
Journal Announcement: RIEDEC80
Target Audience: Practitioners
This is the teacher's edition of the Record Book for the unit "In Orbit" of the Intermediate Science Curriculum Study (ISCS) for level III students (grade 9). The correct answers to the questions from the text are recorded. An introductory note to the student explains how to use the book and is followed by the notes to the teacher. Answers are included to the activities and the excursions. A self evaluation section is included and followed by its answer key. (SA)
Descriptors: *Answer Sheets; Astronomy; *Energy; Grade 9; Individualized Instruction; Instructional Materials; Junior High Schools; *Laboratory Manuals; Laboratory Procedures; *Measurement; Records (Forms); Science Activities; Science Course Improvement Projects; Secondary Education; Secondary School Science; *Solar Radiation; Space Sciences; Worksheets
Identifiers: *Intermediate Science Curriculum Study

ED190370 SE031314
**Probing the Natural World, Level III, Record Book, Student Guide: In Orbit. Intermediate Science Curriculum Study.**
Bonar, John R., Ed.; Hathway, James A., Ed.
Florida State Univ., Tallahassee. Dept. of Science Education.
1972 54p.; For related documents, see SE 031 300-330, ED 035 559-560, ED 049 032, and ED 052 940. Contains colored drawings and print which may not reproduce well.
Sponsoring Agency: National Science Foundation, Washington, D.C.; Office of Education (DHEW), Washington, D.C.
EDRS Price - MF01/PC03 Plus Postage.
Language: English
Document Type: INSTRUCTIONAL MATERIAL (051)
Geographic Source: U.S.; Florida
Journal Announcement: RIEDEC80
Target Audience: Practitioners; Students
This is the student's edition of the Record Book which accompanies the unit "In Orbit" of the Intermediate Science Curriculum Study (ISCS) for level III students (grade 9). Space is provided for answers to the questions from the student text as well as for the optional excursions and the self evaluation. An introductory note to the student explains how to use the book. (SA)
Descriptors: Astronomy; *Energy; Grade 9; Individualized Instruction; Instructional Materials; Junior High Schools; *Laboratory Manuals; Laboratory Procedures; *Measurement; Records (Forms); Science Activities; Science Course Improvement Projects; Secondary Education; Secondary School Science; *Solar Radiation; Space Sciences; *Worksheets
Identifiers: *Intermediate Science Curriculum Study

ED190369 SE031313
**Probing the Natural World, Level III, Teacher's Edition: In Orbit. Intermediate Science Curriculum Study.**
Bonar, John R., Ed.; Hathway, James A., Ed.
Florida State Univ., Tallahassee. Dept. of Science Education.
1972 136p.; For related documents, see SE 031 300-330, ED 035 559-560, ED 049 032, and ED 052 940. Contains photographs and colored and shaded drawings and print which may not reproduce well.
Sponsoring Agency: National Science Foundation, Washington, D.C.; Office of Education (DHEW), Washington, D.C.
EDRS Price - MF01/PC06 Plus Postage.
Language: English
Document Type: TEACHING GUIDE (052)
Geographic Source: U.S.; Florida
Journal Announcement: RIEDEC80
Target Audience: Practitioners
This is the teacher's edition of one of the eight units of the Intermediate Science Curriculum Study (ISCS) for level III students (grade 9). This unit focuses on the properties of sunlight, the use of spectrums and spectroscopes, the heat and energy of the sun, the measurement of astronomical distances, and the size of the sun. Optimal excursions, in addition to the activities, are described for students who wish to study a topic in greater depth. An introduction describes light, inverse squares, orbits, and relativity in the sky. Illustrations accompany the text. (SA)
Descriptors: Astronomy; *Energy; Grade 9; Individualized Instruction; Instructional Materials; Junior High Schools; Laboratory Manuals; *Laboratory Procedures; *Measurement; *Science Activities; Science Course Improvement Projects; Secondary Education; Secondary School Science; *Solar Radiation; Space Sciences
Identifiers: *Intermediate Science Curriculum Study

ED190368 SE031312
**Probing the Natural World, Level III, Student Guide: In Orbit. Intermediate Science Curriculum Study.**
Bonar, John R., Ed.; Hathway, James A., Ed.
Florida State Univ., Tallahassee. Dept. of Science Education.
1972 125p.; For related documents, see SE 031 300-330, ED 035 559-560, ED 049 032, and ED 052 940. Contains photographs and colored and shaded drawings and print which may not reproduce well.
Sponsoring Agency: National Science Foundation, Washington, D.C.; Office of Education (DHEW), Washington, D.C.
EDRS Price - MF01/PC05 Plus Postage.
Language: English
Document Type: INSTRUCTIONAL MATERIAL (051)
Geographic Source: U.S.; Florida
Journal Announcement: RIEDEC80
Target Audience: Practitioners; Students
(cont. next page)

DIALOG File 1: ERIC - 66-85/JUN

This is the student's text of one unit of the Intermediate Science Curriculum Study (ISCS) for level III students (grade 9). This unit focuses on the properties of sunlight, the use of spectrums and spectroscopes, the heat and energy of the sun, the measurement of astronomical distances, and the size of the sun. Activities are student-centered and intended for individualized instruction. The text is accompanied by illustrations. Excursions are provided as optional activities to allow the students to pursue a topic in greater depth. (SA)
Descriptors: Astronomy; *Energy; Grade 9; Individualized Instruction; Instructional Materials; Junior High Schools; Laboratory Manuals; *Laboratory Procedures; *Measurement; *Science Activities; Science Course Improvement Projects; Secondary Education; Secondary School Science; *Solar Radiation; Space Sciences
Identifiers: *Intermediate Science Curriculum Study

ED188947 SE031478
**Planetarium Educator's Workshop Guide. International Planetarium Society Special Report No. 10.**
Friedman, Alan; And Others
California Univ., Berkeley. Lawrence Hall of Science.
1980 190p.
Sponsoring Agency: National Science Foundation, Washington, D.C.
Grant No.: SED-77-18387
Available from: The Spaceshop, Strasenburgh Planetarium, P.O. Box 1480, Rochester, NY 14603 (no price quoted).
EDRS Price - MF01/PC08 Plus Postage.
Language: English
Document Type: TEACHING GUIDE (052); NON-CLASSROOM MATERIAL (055)
Geographic Source: U.S.; California
Journal Announcement: RIENOV80
Target Audience: Practitioners
Presented is a workshop guide for planetarium educators. Seven modules and four appendices focus on organizational patterns, learning theories, questioning strategies, activities for the planetarium, and incorporating all of the above into teaching. The four appendices include a list of the 1978 workshop participants, an annotated bibliography for planetarium educators, program descriptions from the Holt Planetarium at the Lawrence Hall of Science, astronomy quizzes, and classroom activities. (SA)
Descriptors: *Astronomy; Biological Sciences; Earth Science Elementary Secondary Education; *Inservice Education; Learning Modules; *Museums; *Planetariums; Problem Solving; Science Activities; Science Programs; Space Sciences; Teaching Methods ; *Workshops

147 ED187914 CE025594
**Project CHOICE: #61. A Career Unit for Grades 5 and 6. Astronomers. (Science and Engineering Occupations Career Cluster).**
Kern County Superintendent of Schools, Bakersfield, Calif.
Sep 1977 39p.; For related documents see CE 025 584-585, CE 025 587, CE 025 590-596, CE 025 599-600, CE 025 603, CE 025 605, CE 025 607, and CE 025 609.
Sponsoring Agency: Office of Education (DHEW), Washington, D.C.
EDRS Price - MF01/PC02 Plus Postage.
Language: English
Document Type: TEACHING GUIDE (052)
Geographic Source: U.S.; California
Journal Announcement: RIENOV80
Target Audience: Practitioners
This teaching unit, Astronomers, is one in a series of curriculum guides developed by Project CHOICE (Children Have Options in Career Education) to provide the classroom teacher with a source of career-related activities linking 5th and 6th grade elementary classroom experiences with the world of work. These seven lessons on astronomy introduce career possibilities in astronomy by reviewing basic information about astronomy and exploring how astronomers do their work, their job opportunities, their job requirements, and instruments they use. An introductory section gives the rationale for the unit, goals, performance objectives, entry-level assessment, and evaluation. A list of suggested instructional materials, such as films, filmstrips, books, community resources, and art supplies, is included in this section. Each lesson contains a statement of purpose, materials needed for the lesson, an introductory statement, class activities, and a summary activity. Written materials (such as worksheets, surveys, and task cards) are included where feasible. (MEK)
Descriptors: *Astronomy; *Career Awareness; Career Development; *Career Education; Educational Resources; Grade 5 ; Grade 6; Instructional Materials; Intermediate Grades; Learning Activities; Lesson Plans; Occupational Clusters; Occupations; Units of Study
Identifiers: Project CHOICE

ED181844 HE012269
**Innovations in Science Teaching. The Forum for Liberal Education, Volume II, Number 4, February, 1980.**
Mohrman, Kathryn, Ed.
Association of American Colleges, Washington, D.C.
Feb 1980 11p.
Available from: Association of American Colleges, 1818 R St., N.W., Washington, DC 20009
EDRS Price - MF01 Plus Postage. PC Not Available from EDRS.
Language: English
Document Type: PROJECT DESCRIPTION (141); SERIAL (022)
Geographic Source: U.S.; District of Columbia
Journal Announcement: RIEJUN80
Curricular development in undergraduate programs in the biological, physical, and mathematical sciences at a number of colleges and universities are described. One common theme is the continuing interest in computers in higher education. As

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the student bodies of many campuses become more heterogeneous with increasing enrollments of minorities and adults, science departments are adapting their offerings to accommodate different learning styles. Interdisciplinary studies, cooperation between academic science and more applied fields, interinstitutional projects, and school-community programs are among the developments in undergraduate science education. The following programs are described: Queensborough Community College's Comprehensive Improvement of Astronomy Education Program; Hope College's Comprehensive Instructional Program for Multidisciplinary Problem-Solving; Xavier University of Louisiana's CAUSE Project; Ohio State University's Teaching Calculus with Programmable Calculators Program; College of Mount St. Joseph's Modular Anatomy and Physiology Course for Allied Health Students; University of Rochester's Integrated Chemical Information Curriculum Program; California State University at Fullerton's Development of Reasoning in Science Program; Walla Walla College's Interdisciplinary Teaching Cooperative in Marine Sciences Program; and Oklahoma State University's Undergraduate Applied Mathematics Component in Cooperation with Regional Industries Program. A listing of additional programs and resources is included. (SW)

Descriptors: Abstract Reasoning; *Allied Health Occupations Education; Astronomy; Calculus; Chemistry; *College Curriculum ; Computer Assisted Instruction; Computers; *Course Descriptions; *Curriculum Development; Educationally Disadvantaged; Higher Education; Information Retrieval; Institutional Cooperation; Interdisciplinary Approach; Marine Biology; *Mathematics Curriculum; Physiology; Problem Solving School Business Relationship; *Science Curriculum; Scientific Attitudes; Student Needs; *Undergraduate Study

Identifiers: California State University Fullerton; College of Mount Saint Joseph OH; Hope College MI; Ohio State University; Oklahoma State University; Queensborough Community College NY; University of Rochester NY; Walla Walla College WA ; Xavier University LA

ED180535 JC800008

**Science Education in Two-Year Colleges: Earth and Space.**

Edwards, Sandra J.

California Univ., Los Angeles. ERIC Clearinghouse for Junior Coll. Information.; Center for the Study of Community Colleges, Los Angeles, Calif.

Jan 1980 87p.

Sponsoring Agency: National Science Foundation, Washington, D.C.

Grant No.: NSF-SED-77-18477

EDRS Price - MF01/PC04 Plus Postage.

Language: English

Document Type: RESEARCH REPORT (143); TEST, QUESTIONNAIRE (160); BIBLIOGRAPHY (131)

Geographic Source: U.S.; California

Journal Announcement: RIEMAY80

Target Audience: Practitioners

This four-part report examines earth and space science education as revealed in the findings of a study, in which a literature review, an analysis of curriculum data, and a survey of science instructors were undertaken to explore science instruction at two-year institutions. Part I discusses the difficulties encountered in developing earth and space science curricula relevant to diverse student needs, and then analyzes the earth and space science offerings listed in 175 college catalogs and class schedules. Part II explores earth and space science instructional techniques, emphasizing individualized instruction in investigative laboratories, and then discusses class size, instructional mode, use of class time, instructional materials, grading practices, and course competencies and goals as revealed in a survey of 46 earth and space science instructors. Part III provides a profile of these instructors and discusses teacher satisfaction with course materials, support services, and working conditions. Part IV presents summary conclusions pointing out an increased awareness of the needs of non-transfer students in earth and space science curriculum planning. The report concludes with a list of recommendations and a lengthy bibliography. (JP)

Descriptors: Astronomy; College Credits; Community Colleges Course Content; Course Objectives; Courses; Curriculum Development; Curriculum Problems; Curriculum Research; *Earth Science; Geography; Geology; Grading; Instructional Materials Interdisciplinary Approach; Literature Reviews; Meteorology; National Surveys; Oceanography; Program Evaluation; Questionnaires; Remedial Programs; *Science Curriculum; *Science Instruction; Science Teachers; *Space Sciences; Teacher Characteristics; Teaching Methods; *Two Year Colleges Vocational Education

ED178347 SE029283

**Meteorites. Earth Science Curriculum Project Pamphlet Series PS-10.**

Moore, Carleton B.

American Geological Inst., Washington, D.C.

1971 50p.; For related documents, see SE 029 274-282; Not available in hard copy due to copyright restrictions; Photographs and colored charts, graphs, and drawings may not reproduce well

Sponsoring Agency: National Science Foundation, Washington, D.C.

Report No.: ESCP-PS-10

EDRS Price - MF01 Plus Postage. PC Not Available from EDRS.

Language: English

Document Type: CLASSROOM MATERIAL (050); SERIAL (022)

Geographic Source: U.S.; District of Columbia

Journal Announcement: RIEMAR80

Target Audience: Practitioners

Discussed are meteors from an historical and astronomical viewpoint; then presented is the chemical makeup of iron meteorites, stony meteorites, and stony-iron meteorites. Age determination, moon craters, and tektites are also treated. The interested observer learns how to identify meteorites and to describe how they fall. (Author/RE)

(cont. next page)

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DIALOG File 1: ERIC - 66-85/JUN

Descriptors: Aerospace Education; Aerospace Technology; *Astronomy; *Earth Science; Instructional Materials; Pamphlets ; *Science Activities; *Science Course Improvement Projects; Science Education; Science Instruction; Secondary Education; Secondary School Science; *Space Sciences
Identifiers: *Earth Science Curriculum Project; National Science Foundation

ED178346 SE029282
**Field Guide to Astronomy Without a Telescope. Earth Science Curriculum Project Pamphlet Series PS-9.**
Dexter, William A.
American Geological Inst., Washington, D.C.
1971 60p.; For related documents, see SE 029 274-283; Not available in hard copy due to copyright restrictions; Photographs and colored charts, graphs, and drawings may not reproduce well
Sponsoring Agency: National Science Foundation, Washington, D.C.
Report No.: ESCP-PS-9
EDRS Price - MF01 Plus Postage. PC Not Available from EDRS.
Language: English
Document Type: CLASSROOM MATERIAL (050); SERIAL (022)
Geographic Source: U.S.; District of Columbia
Journal Announcement: RIEMAR80
Target Audience: Practitioners
This guide provides the interested student with a wide range of astronomical investigations that require a minimum of equipment. Activities focus on analysis and understanding of numerous celestial events which are observable every day. The guide is intended to lead the amateur through initial steps in the understanding of some of the functions of the universe. (Author/RE)
Descriptors: Aerospace Education; Aerospace Technology; *Astronomy; *Earth Science; Instructional Materials; Pamphlets ; *Science Activities; *Science Course Improvement Projects; Science Education; Science Instruction; Secondary Education; Secondary School Science; *Space Sciences
Identifiers: *Earth Science Curriculum Project; National Science Foundation

ED178315 SE029189
**Introduction to Astrophysics. Curriculum Developed by Faculty Workshop at University of Illinois at Chicago, Summer 1974.**
Illinois Univ., Chicago. Chicago Circle Campus.
1974 167p.; Not available in hard copy due to marginal legibility of original document
Sponsoring Agency: National Science Foundation, Washington, D.C.
Grant No.: NSF-GZ-3437
EDRS Price - MF01 Plus Postage. PC Not Available from EDRS.
Language: English
Document Type: NON-CLASSROOM MATERIAL (055)
Geographic Source: U.S.; Illinois
Journal Announcement: RIEMAR80
Target Audience: Practitioners
The course outlines presented in this report are intended to be used to teach astrophysics to nonscience majors at the junior and senior college level. An extensive set of notes are included which can be useful to an instructor as guidelines for presentation. Additional equipment and references for use in teaching astrophysics are suggested. (SA)
Descriptors: *Astronomy; College Science; Course Content; Course Descriptions; *Curriculum Development; Educational Resources; Higher Education; *Instructional Materials; *Minicourses; *Physics; Science Curriculum; Science Instruction; Summer Programs; Summer Science Programs; Undergraduate Study; Workshops
Identifiers: *National Science Foundation

ED178232 RC011547
**Sixth Grade Outdoor Education Program. Outdoor Curriculum Guide.**
Densmore, Tom, Comp.; And Others
Dixon Public Schools, N.J.
1978 195p.; Contains some light print
EDRS Price - MF01/PC08 Plus Postage.
Language: English
Document Type: TEACHING GUIDE (052)
Geographic Source: U.S.; Illinois
Journal Announcement: RIEMAR80
Target Audience: Practitioners
Compiled for teachers whose sixth grade students participate in the resident camping program of the Dixon Public Schools (Dixon, Illinois), this guide offers extensive and detailed information for use in planning the camp curriculum. Activities are suggested for environmental study, group socialization, and recreation. Environmental study units include orienteering, weather study, identification of plants and animals, geology, and astronomy. Background information is included for each unit along with suggested activities, instructions, and lists of materials needed. The geology section, for example, provides information on regional geological history, illustrations of fossils commonly found in the area, and procedures for conducting soil study and gully study units. Socialization activities require group problem solving efforts and facilitate the sharing of experiences. Recreation covers the evening campfire from fire building to songs and skits, art projects using natural materials, 15 types of hikes that develop awareness of natural surroundings, and outdoor cooking including menus and 80 recipes for outdoor meals. The guide lists safety and emergency procedures specific to the program as well as first aid measures for common camping injuries. (JH)
Descriptors: Art Activities; Curriculum Development; Curriculum Guides; *Environmental Education; *Experiential Learning; Grade 6; *Group Activities; Group Dynamics; Guides; Instructional Materials; Intermediate Grades; *Learning

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Activities; *Outdoor Education; Problem Solving; *Recreational Activities; Resident Camp Programs; Resource Materials; Safety ; Socialization; Units of Study
Identifiers: *Dixon Public Schools IL

ED176910 RC011561
**Teacher's Guide to Outdoor Education Grades K-6.**
Kemp, Peter, Comp.; Nemmers, Larry, Comp.
Elgin School District 46, Ill.
1971 265p.
EDRS Price - MF01 Plus Postage. PC Not Available from EDRS.
Language: English
Document Type: TEACHING GUIDE (052); INSTRUCTIONAL MATERIAL (051)
Geographic Source: U.S.; Illinois
Journal Announcement: RIEFEB80
Target Audience: Practitioners; Students

This teacher's guide for planning the elementary outdoor education curriculum focuses primarily, though not exclusively, on activities for sixth graders who participate in a three-day resident program at Camp Edwards. Over 150 activities are organized under the subject areas of natural science, language arts, social studies, mathematics, and music; ten topics under natural science include plant and animal study, geology, astronomy, winter survival, marshland ecology and water study, and contour map reading. Subject matter areas are generally integrated into natural science activities and treated as tools for study and reporting of experiences in the natural sciences. Each area of study contains--in addition to a wide variety of learning activities--a statement of major objectives, background information for the teacher, discovery questions for students, and activities to help assess the results of the camping experiences. Pre-camp, in-camp, and post-camp learning activities are described, many in detail. The mathematics section, for example, gives complete instructions for five methods of measuring the height of a tree and complete plans for constructing a clinometer, a trundle wheel, a sighting level, and a surveyor's level. An appendix contains student worksheets and a bibliography of 32 entries in outdoor education. (JH)

Descriptors: Art Activities; Curriculum Development; Curriculum Guides; Educational Objectives; Elementary Education; Elementary School Mathematics; Elementary School Science; Environmental Education; *Experiential Learning; Health Education; Instructional Materials; Integrated Activities; Language Arts; *Learning Activities; Lesson Plans Music Activities; *Natural Sciences; *Outdoor Education; Physical Education; *Resident Camp Programs; Social Studies; *Units of Study; Worksheets

ED176530 FL007430
**Teaching English as a Second Language: A Handbook for Science. Curriculum Bulletin Number 75CBM5, Secondary Level.**
Azios, Maria Leticia; And Others
Houston Independent School District, Tex.
1975 158p.
EDRS Price - MF01/PC07 Plus Postage.
Language: English; Spanish
Document Type: TEACHING GUIDE (052)
Geographic Source: U.S.; Texas
Journal Announcement: RIEFEB80
Target Audience: Practitioners

This course guide is intended for classroom use by teachers of secondary level science to Spanish-speaking students of English as a second language (ESL). Both science instruction and acquisition of English scientific terminology are emphasized, within the framework of increasing overall student proficiency in English. The book is prefaced with a rationale to guide the teacher. Units present drills in repetition, substitution, and question answering. Topics covered include the metric system, matter and temperature, solutions, the microscope, the cell, mitosis, genetics, taxonomic classification, record breakers among animals, the human ear, the skeletal system, digestion, flowers and seeds, the structure of the earth, the water cycle, oceanography, astronomy, anthropology, and space exploration. Ample illustrations are provided,, laboratory activities are described, and Spanish translations of many assignments are provided to assist the student in mastering new terminology. (JB)

Descriptors: Anatomy; Anthropology; Astronomy; Bilingual Students; Biology; Botany; Chemistry; Course Descriptions; *English (Second Language); Genetics; Geology; Instructional Materials; Laboratory Procedures; *Language Instruction; Material Development; Measurement; Metric System; Oceanography ; Physics; Science Instruction; Science Laboratories; *Science Materials; Secondary Education; *Secondary School Science; Second Language Learning; Space Sciences; *Spanish; Spanish Speaking; Zoology

ED171567 SE027787
**Focus on the Stars.**
Geary, Pat; And Others
Nebraska State Dept. of Education, Lincoln.
1978 87p.; Not available in hard copy due to copyright restrictions; Appendix E contains marginal legibility
EDRS Price - MF01 Plus Postage. PC Not Available from EDRS.
Language: English
Document Type: TEACHING GUIDE (052)
Geographic Source: U.S.; Nebraska
Journal Announcement: RIEOCT79
Government: State
Target Audience: Practitioners

This document consists of a series of astronomy activities for intermediate grade students. It contains three major teaching sections. Teacher Section I deals with stars, constellations, and galaxies and presents a series of demonstrations, discussion topics, readings, and

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DIALOG File 1: ERIC - 66-85/JUN

hands-on-activities. Teachers Section II is concerned with a planetarium visit. Teacher Section III contains information needed to conduct a night sky watch. Five Appendices include student activities and simplified sky charts. A glossary of terms and a useful bibliography of resources are provided following the entries in the Appendices. (Author/MA)
Descriptors: *Astronomy; Earth Science; Elementary Education ; *Elementary School Science; *Intermediate Grades; Learning Activities; Lesson Plans; Planetariums; *Science Activities; *Science Education; Teaching Guides

ED170168# SE027682
**Effective Astronomy Teaching and Student Reasoning Ability: A Workshop.**
Schatz, Denis; And Others
California Univ., Berkeley. Lawrence Hall of Science.
1978 195p.
Sponsoring Agency: National Science Foundation, Washington, D.C.
Grant No.: NSF-SED-77-08724
Available from: The Astronomical Society of the Pacific, 1290 - 24th Avenue, San Francisco, California 94122 ($5.00 plus $1.50 postage and handling)
Document Not Available from EDRS.
Language: English
Document Type: TEACHING GUIDE (052)
Geographic Source: U.S.; California
Journal Announcement: RIESEP79
This document is a study guide designed to accompany an astronomy workshop conducted by the Task Group on Education in Astronomy. The purpose of the workshop is to improve the teaching of introductory astronomy courses for high-school and college non-science majors. Titles of the sections include: (1) Student Reasoning Patterns; (2) Analysis of Astronomical Concepts; (3) Implications of Piaget's Theory for the Teaching of Astronomy; (4) Analysis of Reading Materials; (5) Analysis of Laboratory Activities; and (6) Analysis of Films. Appendices provide bibliographies, resource lists, and checklists. (MA)
Descriptors: *Astronomy; Concept Formation; Higher Education ; *Instructional Materials; *Logical Thinking; Program Guides *Resource Materials; *Science Activities; *Science Education; Secondary Education; Workshops
Identifiers: Piaget (Jean)

ED170155 SE027633
**Supplementary Activities for Enriching the Teaching of Earth Science: Astronomy, Geology, Meteorology, Oceanography.**
Exline, Joseph D., Ed.
Virginia State Dept. of Education, Richmond.
Jun 1978 207p.; Appendix (Solar Heater Poster) removed due to irreproducibility
Sponsoring Agency: National Inst. of Education (DHEW), Washington, D.C.
EDRS Price - MF01/PC09 Plus Postage.
Language: English
Document Type: INSTRUCTIONAL MATERIAL (051)
Geographic Source: U.S.; Virginia
Journal Announcement: RIESEP79
Government: State
Target Audience: Practitioners; Students
This publication is intended to be an aid for secondary school science teachers in providing some additional student-oriented activities to enrich the earth science program. These activities have been classroom tested by teachers and have been considered by these teachers to be educationally successful. This publication is a product of the Earth Science Communication Program of the state of Virginia which was funded by the National Institute of Education. The activities introduced cover four areas: (1) astronomy; (2) geology; (3) meteorology; and (4) oceanography. An introductory activity about earth science and society, and suggestions for developing charts are also presented. All the activities are presented in the same way including the purpose, materials, pre-lab activities, procedures and conclusions. Some activities also include charts and/or tables. (HM)
Descriptors: *Earth Science; Geology; Instructional Materials; Resource Materials; *Science Activities; Science Education; Secondary Education; *Secondary School Science; *Student Developed Materials; *Teaching Guides
Identifiers: *Earth Science Communication Programs (Virginia); *National Institute of Education

ED162913 SE025475
**Course and Curriculum Improvement Materials: Mathematics, Science, Social Sciences - Elementary, Intermediate, Secondary.**
National Science Foundation, Washington, D.C.
May 1976 61p.
Report No.: NSF-E-75-44
Available from: Superintendent of Documents, U.S. Government Printing Office, Washington, D.C. 20402 (Stock Number 038-000-00278-3; $1.05)
EDRS Price - MF01/PC03 Plus Postage.
Language: English
Document Type: CLASSROOM MATERIAL (050)
Geographic Source: U.S.; District of Columbia
Journal Announcement: RIEAPR79
Government: Federal
Target Audience: Practitioners
This is a list of curriculum improvement materials produced by major course and curriculum projects supported by the National Science Foundation's Division of Pre-College Education in Science. The materials are grouped by educational level (elementary, intermediate, and secondary) and within each level by broad discipline groupings (mathematics, science, and the social sciences). Under the science grouping, materials are found on astronomy, biology, chemistry,
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DIALOG File 1: ERIC - 66-85/JUN

oceanography, meteorology, and physics. The materials include films, books, and instructional equipment. Appended are lists of abbreviations, grantee institutions, project numbers, directors and projects, and materials produced for foreign countries. (BB)
Descriptors: Annotated Bibliographies; *Bibliographies; *Educational Equipment; *Educational Resources; Filmographies Films; *Instructional Materials; Resources; *Science Course Improvement Projects; Science Education
Identifiers: National Science Foundation

ED162649 IR006625
**Implementation and Validation of a New Course in Introductory Astronomy at the College Level.**
Evans, Alan D.
Apr 1978 10p.; Paper presented at the Annual Meeting of the Association for Educational Communications and Technology, (Kansas City, Missouri, April 1978)
EDRS Price - MF01/PC01 Plus Postage.
Language: English
Document Type: CONFERENCE PAPER (150)
Geographic Source: U.S.; Ohio
Journal Announcement: RIEAPR79
Three members of the Ohio State University Astronomy department developed an audiovisual program in Astronomy to provide a format for more active student participation than is possible in large lecture sessions. The program consists of 18 filmstrip/cassette modules and an integrated textbook which were utilized on an individual basis, allowing students to repeat material prior to instructor meetings. The formative evaluation design, pilot testing, and procedures are provided, as well as the results of a study comparing student reactions and achievement in experimental groups employing this program with those in traditional lecture sections of the course. (RAO)
Descriptors: *Astronomy; *Audiovisual Instruction; *Formative Evaluation; *Higher Education; Individualized Instruction; *Intermode Differences; Learning Modules; Lecture Method

ED161728 SE025193
**Mars: The Viking Discoveries.**
French, Bevan M.
National Aeronautics and Space Administration, Washington, D.C.
Oct 1977 37p.; Not available in hard copy due to poor reproducibility of photographes
Report No.: NASA-EP-146
Available from: Superintendent of Documents, U.S. Government Printing Office, Washington, D.C. 20402 (Stock No. 033-000-00703-5; $1.50)
EDRS Price - MF01 Plus Postage. PC Not Available from EDRS.
Language: English
Document Type: JOURNAL ARTICLE (080)
Geographic Source: U.S.; District of Columbia
Journal Announcement: RIEMAR79
Government: Federal
Target Audience: Practitioners
This booklet describes the results of NASA's Viking spacecraft on Mars. It is intended to be useful for the teacher of basic courses in earth science, space science, astronomy, physics, or geology, but is also of interest to the well-informed layman. Topics include why we should study Mars, how the Viking spacecraft works, the winds of Mars, the chemistry of Mars, experiments in relativity, and the future of the Viking spacecraft. An appendix includes suggestions for further reading, classroom experiments and activities, and suggested films. (BB)
Descriptors: *Aerospace Education; Aerospace Technology; *Astronomy; *Earth Science; Geology; *Instructional Materials Physics; *Science Activities; Science Education; Science Experiments; *Space Sciences
Identifiers: *Mars (Planet)

ED161725 SE025189
**Apollo-Soyuz Pamphlet No. 9: General Science. Apollo-Soyuz Experiments in Space.**
Page, Lou Williams; Page, Thornton
National Aeronautics and Space Administration, Washington, D.C.
Oct 1977 87p.; For related documents, see SE 025 181-188; Photographs may not reproduce well
Report No.: NASA-EP-141
Available from: Superintendent of Documents, U.S. Government Printing Office, Washington, D.C. 20402 (Stock No. 033-800-00688-8; Available in sets only - $10.00)
EDRS Price - MF01/PC04 Plus Postage.
Language: English
Document Type: BOOK (010)
Geographic Source: U.S.; District of Columbia
Journal Announcement: RIEMAR79
Government: Federal
Target Audience: Practitioners
This is the last pamphlet in a series of nine discussing the Apollo-Soyuz mission and experiments. This set is designed as a curriculum supplement for secondary and college teachers, supervisors, curriculum specialists, textbook writers, and the general public. These booklets provide sources of ideas, examples of the scientific method, references to standard textbooks, and descriptions of space experiments. There are numerous illustrations, as well as questions for discussion (with answers) and a glossary of terms. This last booklet describes the Apollo-Soyuz Mission, the spacecraft, astronomy experiments, geoscience experiments, biology experiments, and materials experiments performed on the mission. (MA)
Descriptors: Aerospace Education; College Science; Earth Science; *General Science; Higher Education; *Instructional Materials; *Learning Activities; *Science Education; Secondary Education; Secondary School Science; Space Sciences;
(cont. next page)

**DIALOG File 1: ERIC - 66-85/JUN**

*Supplementary Reading Materials; *Textbooks
Identifiers: National Aeronautics and Space Administration

ED161719 SE025183
**Apollo-Soyuz Pamphlet No. 3: Sun, Stars, In Between. Apollo-Soyuz Experiments in Space.**
Page, Lou Williams; Page, Thornton
National Aeronautics and Space Administration, Washington, D.C.
Oct 1977 63p.; For related documents, see SE 025 181-189 ; Marginally legible in parts due to small print; Photographs will not reproduce clearly
Report No.: NASA-EP-135
Available from: Superintendent of Documents, U.S. Government Printing Office, Washington, D.C. 20402 (Stock No. 033-800-00688-8; Available in sets only - $10.00)
EDRS Price - MF01/PC03 Plus Postage.
Language: English
Document Type: BOOK (010)
Geographic Source: U.S.; District of Columbia
Journal Announcement: RIEMAR79
Government: Federal
Target Audience: Practitioners
This booklet is the third in a series of nine that discuss the Apollo-Soyuz mission and experiments. This set is designed as a curriculum supplement for secondary and college teachers, supervisors, curriculum specialists, textbook writers, and the general public. These booklets provide sources of ideas, examples of the scientific method, references to standard textbooks, and descriptions of space experiments. There are numerous illustrations, as well as questions for discussion (with answers) and a glossary of terms. The series has been reviewed by selected high school and college teachers nationwide. This booklet is concerned with the layers in the sun, stars and gas clouds in the Milky Way, and the amount of helium in space. (MA)
Descriptors: *Astronomy; College Science; Earth Science; Higher Education; *Instructional Materials; *Learning Activities; Physical Sciences; *Science Education; Secondary Education; Secondary School Science; Space Sciences; *Supplementary Reading Materials; *Textbooks
Identifiers: National Aeronautics and Space Administration

ED161706 SE025160
**Minicourses in Astrophysics, Modular Approach, Vol. II.**
Illinois Univ., Chicago.
1977 138p.; For related document, see SE 025 159; Contains occasional blurred, dark print
Sponsoring Agency: National Science Foundation, Washington, D.C.
Bureau No.:SED-75-21297
EDRS Price - MF01/PC06 Plus Postage.
Language: English
Document Type: CLASSROOM MATERIAL (050)
Geographic Source: U.S.; Illinois
Journal Announcement: RIEMAR79
Government: Federal
Target Audience: Practitioners
This is the second of a two-volume minicourse in astrophysics. It contains chapters on the following topics: stellar nuclear energy sources and nucleosynthesis; stellar evolution; stellar structure and its determination; and pulsars. Each chapter gives much technical discussion, mathematical treatment, diagrams, and examples. References are included with each chapter. (BB)
Descriptors: *Astronomy; *Curriculum Guides; Evolution; Graduate Study; *Higher Education; *Instructional Materials; Light; Mathematics; *Minicourses; Nuclear Physics; *Physics; Radiation; Relativity; Science Education; Space Sciences
Identifiers: *Astrophysics

ED161705 SE025159
**Minicourses in Astrophysics, Modular Approach, Vol. I.**
Illinois Univ., Chicago.
1977 144p.; For related document, see SE 025 160; Contains occasional light and broken type
Sponsoring Agency: National Science Foundation, Washington, D.C.
Bureau No.:SED-75-21297
EDRS Price - MF01/PC06 Plus Postage.
Language: English
Document Type: CLASSROOM MATERIAL (050)
Geographic Source: U.S.; Illinois
Journal Announcement: RIEMAR79
Government: Federal
Target Audience: Practitioners
This is the first volume of a two-volume minicourse in astrophysics. It contains chapters on the following topics: planetary atmospheres; X-ray astronomy; radio astrophysics; molecular astrophysics; and gamma-ray astrophysics. Each chapter gives much technical discussion, mathematical treatment, diagrams, and examples. References are included with each chapter. (BB)
Descriptors: *Astronomy; *Curriculum Guides; Evolution; Graduate Study; *Higher Education; *Instructional Materials; Light; Mathematics; *Minicourses; Nuclear Physics; *Physics; Radiation; Relativity; Science Education; Space Sciences
Identifiers: *Astrophysics

ED161595 95 RC010828
**Learning Achievement Packages. Mexican American Studies, English-Spanish.**
Astacio, Ramon; Iruegas, Efrain
Calexico Unified School District, Calif. Bilingual Education Program.; Dissemination and Assessment Center for Bilingual Education, Austin, Tex.
1978 129p.; Revised from 1976 printing ; Prepared in conjunction with Calexico Intercultural Design, Calif.

(cont. next page)

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DIALOG File 1: ERIC - 66-85/JUN

Sponsoring Agency: Office of Bilingual Education (DHEW/OE), Washington, D.C.
EDRS Price - MF01/PC06 Plus Postage.
Language: Spanish; English
Document Type: CLASSROOM MATERIAL (050)
Geographic Source: U.S.
Journal Announcement: RIEMAR79
Target Audience: Practitioners
Developed originally for grades 7-12, the three bilingual Mexican American studies curriculum units on the pre-Hispanic cultures of the Olmecs, Mayas, and Aztecs present information for the teacher and for the student, a glossary, worksheets, an answer key, a test, and a bibliography in Spanish and English. The cross section of materials are intended to deal with the learning problems of students with special language difficulties. Specific unit content is as follows: Olmec--origin, cultural sites, education, religion (spirits of nature, jagure cult, adoration of the dead, religious festivities, magical powers), and art; Maya--old and new empires, government, arts and sciences (architecture, literature, arts, sciences), and religion; Aztec--origin, territory of Tenochtitlan, government, royal line, religion (human sacrifice, Aztec deities), education, arts and sciences, literature, Aztec calendar, and customs (social tasks, food). Exercises for students include location of places on maps, matching, questions for short answers, definitions, multiple choice. The worksheets and tests are designed as duplicating masters. (RS)
Descriptors: *American Indian Culture; Art; Astronomy; *Bilingual Education; Cultural Education; *Curriculum Guides; Education; Ethnic Origins; *Ethnic Studies; Government (Administrative Body); History; Instructional Materials; Learning Activities; Literature; Mexican American Education; *Mexican American History; Mexican Americans; Religion; Secondary Education; Secondary School Curriculum; Social Studies; Spanish Speaking; Tests
Identifiers: Aztec (People); Maya (People; *Mexico; Olmec (Tribe); *Pre Hispanic Culture

ED160348 SE024583
**NASA Facts, Voyager.**
National Aeronautics and Space Administration, Washington, D.C. Educational Programs Div.
1977 12p.; Photographs may not reproduce well
Report No.: NF-87/10-77
Available from: Superintendent of Documents, U.S. Government Printing Office, Washington, D.C. 20402 (Stock Number 033-000-00694-2; No price quoted)
EDRS Price - MF01/PC01 Plus Postage.
Language: English
Document Type: JOURNAL ARTICLE (080)
Geographic Source: U.S.; District of Columbia
Journal Announcement: RIEFEB79
Government: Federal
This document is one of a series of publications of the National Aeronautics and Space Administration (NASA) on facts about the exploration of Jupiter and Saturn. This NASA mission consists of two unmanned Voyager spacecrafts launched in August and September of 1977, and due to arrive at Jupiter in 1979. An account of the scientific equipment aboard the spacecraft, the experiments to be carried out, and a mission profile are outlined. Two student-oriented projects, a glossary of related terms, and a suggested reading list are provided. (GA)
Descriptors: *Aerospace Education; Aerospace Technology; *Astronomy; Instructional Materials; Research; Science Education; *Scientific Research; Secondary Education; *Secondary School Science; *Space Sciences; Student Projects
Identifiers: Solar System; *Voyager Mission

ED159058 SE024911
**From Sundials to Atomic Clocks: Understanding Time and Frequency.**
Jespersen, James; Fitz-Randolph, Jane
National Bureau of Standards (DOC), Washington, D.C.
Dec 1977 180p.; Occasional blue print may not reproduce well; Cartoons on pages 8, 15, 16, 51, 62, 64, 68, 71, 75, 94, 109, 116, 121, 162 deleted due to copyright restrictions
Report No.: NBS-Monogr-155
Available from: Superintendent of Documents, U.S. Government Printing Office, Washington, D.C. 20402 (Stock Number 003-003-01650-1; $4.00)
EDRS Price - MF01/PC08 Plus Postage.
Language: English
Document Type: BOOK (010)
Geographic Source: U.S.; District of Columbia
Journal Announcement: RIEJAN79
Government: Federal
An introduction to time, timekeeping, and the uses of time information, especially in the scientific and technical areas, are offered in this book for laymen. Historical and philosophical aspects of time and timekeeping are included. The scientific thought on time has been simplified. Contents include: the nature of time, time and frequency, early man-made clocks, quality factor, modern clocks (quartz, atomic, etc.) modern watches (electronic, quartz-crystal, etc.), time scales, the correct time, time signals, standard time, applications of time, time and mathematics, time and physics, time and astronomy, time and automation, time as information, and the future of time. (MP)
Descriptors: *Instructional Materials; *Mathematical Applications; *Measurement; Postsecondary Education; Reference Materials; *Time
Identifiers: *Clocks; Timekeeping

ED158968 SE024455
**Sciences: A Select List of U.S. Government Produced Audiovisual Materials - 1978.**
National Archives and Records Service (GSA), Washington,
(cont. next page)

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**DIALOG File 1: ERIC - 66-85/JUN**

D.C. National Audiovisual Center.
1978 53p.; Not available in hard copy due to marginal legibility of original document
EDRS Price - MF01 Plus Postage. PC Not Available from EDRS.
Language: English
Document Type: BIBLIOGRAPHY (131)
Geographic Source: U.S.; District of Columbia
Journal Announcement: RIEJAN79
Government: Federal
This publication is a catalog that contains the National Audiovisual Center's materials on Science. There are twelve areas in this catalog: Aerospace Technology, Astronomy, Biology, Chemistry, Electronics and Electricity, Energy, Environmental Studies, Geology, Mathematics and Computer Science, Oceanography, Physics, and Weather/Meteorology. Each area is subdivided into many titles, and each entry contains all the information pertinent to the particular title. Rental and purchase policies are stated at the end, together with a producer/sponsor codes list. A title index is also supplied. (GA)
Descriptors: *Audiovisual Aids; *Catalogs; Elementary School Science; Elementary Secondary Education; Films; *Instructional Materials; *Reference Materials; Science Education; *Sciences Secondary School Science

ED157712 SE024554
**Elementary School Aerospace Activities: A Resource for Teachers.**
Kopp, O. W.; And Others
Nebraska Univ., Lincoln.
1977 137p.; Photographs may not reproduce well
Sponsoring Agency: National Aeronautics and Space Administration, Washington, D.C.
Report No.: NASA-EP-147
Available from: Superintendent of Documents, U.S. Government Printing Office, Washington, D.C. 20402 (Stock Number 033-000-00693-4; $3.00)
EDRS Price - MF01/PC06 Plus Postage.
Document Type: CLASSROOM MATERIAL (050)
Journal Announcement: RIEDEC78
Target Audience: Practitioners
This publication is designed for use by elementary school teachers when introducing aerospace developments into classroom programs. Its materials, prepared at the University of Nebraska-Lincoln, are grouped into ten sections: (1) earth characteristics that affect flight; (2) flight in the atmosphere; (3) rockets; (4) technological advances; (5) unmanned earth satellites; (6) unmanned exploration of the solar system; (7) life-support systems; (8) astronauts; (9) man in space; and (10) projections. Each section includes an outline followed by activities suggested to correlate with the outline. Each activity is geared for the appropriate age level, 5-7, 8-9, 10-11. Suggestions for research topics are listed. The metric system of measurement is used throughout. A bibliography of selected printed materials is included at the end of each section. A complete list of these printed and audiovisual materials is placed at the end of the handbook. In addition to this bibliography, a teacher resource list is presented. Addresses of publishers, producers, and distributers, and a glossary of some aerospace terms are also included at the end of the publication. (Author/HM)
Descriptors: *Aerospace Education; Astronomy; Elementary Education; *Elementary School Science; Instructional Materials; *Resource Materials; *Science Activities; Science Education Space Sciences; *Teaching Guides
Identifiers: *National Aeronautics and Space Administration

ED156382 RC010570
**Minority Contributions to Science, Engineering, and Medicine.**
Funches, Peggy; And Others
San Diego City Schools, Calif.
1978 179p.
EDRS Price - MF01/PC08 Plus Postage.
Language: ENGLISH
Document Type: BOOK (010)
Journal Announcement: RIENOV78
Offering an historical perspective on the development of science, engineering, medicine, and technology and providing current role models for minority students, the bulletin lists the outstanding contributions made by: (1) Blacks - medicine, chemistry, architecture, engineering, physics, biology, and exploration; (2) Hispanos - biomedical research, botany, biology, physics, chemistry, space education, physiology, mathematics, pharmacology, meteorology, oceanography, sociology, geology, anthropology, psychology, engineering, electronics, and computers; (3) Asian Americans - astronomy, engineering, technology, mathematics, medicine, health, physics, dentistry, chemistry, and space education; (4) American Indians - engineering, botany, physics, architecture, chemistry, biology, agronomy, forestry, environmental science, weather forecasting, science education, audiology, otolaryngology, archeology, nursing, mathematics, anthropology, psychology, dentistry, medicine, and pharmacology. Also listed are Hispanic Nobel Prize winners, scientists of the 20th century, and professors; Moslem and Jewish scientists of Medieval Spain (circa 900-1400), statistics on the representation of Hispanos in science; programs designed to meet the Hispanos' health service needs; programs for Indian students and agencies to contact for possible financial aid; groups of special interest to Indian students; and available resources and creative ways to incorporate knowledge and appreciation of minority contributions into the regular instructional program. (NQ)
Descriptors: *Achievement; American Indians; Asian Americans; *Biographical Inventories; Blacks; Cultural Awareness; *Engineering; Ethnic Studies; Health Personnel; Instructional Materials; Leadership; *Medicine; *Minority Groups; Pharmacy; *Physical Sciences; Resource Materials; Role Models; Sciences Spanish Speaking

DIALOG File 1: ERIC - 66-85/JUN

ED151326 SP012295
**The Effects of Curriculum Changes and Teacher Structuring on Pupils' Perceptions of Australian Learning Environments.**
Tisher, Richard P.; Power, Colin N.
1978 27p.
EDRS Price - MF01/PC02 Plus Postage.
Language: ENGLISH
Document Type: RESEARCH REPORT (143)
Journal Announcement: RIEJUL78
The studies reported in this paper provide evidence that the introduction of self-paced curriculum materials into learning environments where they had not been previously used produces changes in pupils' perceptions of their environments and in the manner in which these function, even when the teachers' beliefs about effective teaching are dissonant to the approach adopted by the materials. Three groups of Australian ninth-grade science teachers, and graduates undertaking the Diploma in Education, were studied, arranged according to their dissonant, consonant, or ambivalent attitudes toward the Australian Science Education Project (ASEP) curriculum units. These units, designed to foster inquiry by pupils, change the role of the teacher from that of an information disseminator to a resource person and emphasize that science is an integrated field of study, not just physics, chemistry, biology, geology, and astronomy. Observation of student-teacher classroom interaction and interpretation of student achievement and attitude data revealed that (1) a mismatch between the teacher's approach and that of the materials did not significantly disadvantage the student either cognitively or affectively; (2) added, teacher-developed structure improved student performance for all three groups, particularly in those classes where teachers did not value the ASEP approach; (3) while pupils' entry characteristics did not markedly affect their perceptions of the new learning environment, those who previously enjoyed the lessons and succeeded, continued to do so in the ASEP setting; (4) certain environmental variables (e.g., apathy, diversity, information-giving, rest periods) contributed to variations in achievement, while some of these, and others (e.g., cohesiveness, goal direction, friction, cliquishness, disorganization) contributed more to variations in attitude toward environmental issues than did the ASEP approach. (MJB)
Descriptors: Achievement; *Classroom Research; Educational Innovation; Foreign Countries; *Instructional Materials; Learning Activities; Learning Processes; *Science Curriculum; *Student Attitudes; *Teacher Attitudes
Identifiers: *Australia; Australian Science Education Project

ED148606# SE023480
**Science Books & Films, Volume XIII, Number 3.**
Finch, Shari, Ed.
American Association for the Advancement of Science, Washington, D.C.
Dec 1977 69p.
Available from: Publications Department (Dept. W3), American Association for the Advancement of Science, 1515 Massachusetts Ave., N.W., Washington, D.C. 20005 ($16.00 per year, $4.25 single copy)
Document Not Available from EDRS.
Language: ENGLISH
Document Type: BIBLIOGRAPHY (131)
Journal Announcement: RIEMAY78
This document provides annotated bibliographies of 205 books, 61 children's books, and 87 films all of which are science related. Each annotation includes author, publisher, title, number of pages, cost, an appraisal from highly recommended to not recommended, and level of difficulty from preschool to professional. Entries are grouped by topics including: Psychology, Ethics, Economics, Conservation, Education, Pure Science, Mathematics, Astronomy, Physics, Chemistry, Biology, Engineering, Agriculture, Hobbies, Archeology, and others. (SL)
Descriptors: *Annotated Bibliographies; *Book Reviews; *Books; *Childrens Literature; Educational Media; Elementary Secondary Education; *Films; Higher Education; Mathematics; Science Education; *Sciences; Social Sciences

ED136509 EC100024
**Project Talented and Gifted, End of Grant Report. (ESEA Title III) Appendix IV: Part 1 of Two Bindings.**
[1977 148p.; For related documents, see EC 092 051 and EC 092 052
EDRS Price - MF01/PC06 Plus Postage.
Document Type: RESEARCH REPORT (143)
Journal Announcement: RIEAUG77
Target Audience: Practitioners
Presented is a collection of instructional program units, or mini-workshops, developed by the coordinators and resource personnel working in Project Talented and Gifted and used by students participating in the project at the elementary and secondary level. Sections on each topic usually cover objectives and outlines of each session in the workshop, materials needed, a bibliography of resources, suggested resource persons, topics for individual research, library skills needed, and modes of presentation. Included are units on such topics as physiology and heredity, electronics, solar energy, bicycle maintenance, animal behavior, ornithology, archaeology, meteorology, astronomy, statistics, and ecology. (IM)
Descriptors: *Educational Resources; Elementary Secondary Education; Exceptional Child Education; *Gifted; *Instructional Programs; *Learning Activities; Learning Modules; Resource Materials; Science Curriculum; Social Studies; *Talent; *Teacher Developed Materials; Teaching Methods; *Units of Study

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DIALOG File 1: ERIC - 66-85/JUN

ED133200 SE021776
**The Supernova - A Stellar Spectacle.**
Straka, W. C.
American Astronomical Society, Princeton, N.J.
Sep 1976 50p.; For related documents, see SE 021 773-775; Photographs may not reproduce well
Sponsoring Agency: National Aeronautics and Space Administration, Washington, D.C.; National Science Foundation, Washington, D.C.
Report No.: NASA-EP-126
Available from: Superintendent of Documents, U.S. Government Printing Office, Washington, D.C. 20402 (Stock Number 033-000-00654-3, $1.30)
EDRS Price - MF01/PC02 Plus Postage.
Document Type: CLASSROOM MATERIAL (050)
Journal Announcement: RIEMAY77
Target Audience: Practitioners
This booklet is part of an American Astronomical Society curriculum project designed to provide teaching materials to teachers of secondary school chemistry, physics, and earth science. The following topics concerning supernovae are included: the outburst as observed and according to theory, the stellar remnant, the nebular remnant, and a summary of some of the unsolved puzzles. Suggested student projects are given, with several levels of difficulty, so that the teacher may choose material appropriate for the particular class. (MH)
Descriptors: *Astronomy; Curriculum; *Instructional Materials; Science Education; *Scientific Research; Secondary Education; *Secondary School Science; *Space Sciences
Identifiers: National Aeronautics and Space Administration; *Supernovae

ED133199 SE021775
**Extragalactic Astronomy: The Universe Beyond Our Galaxy.**
Jacobs, Kenneth Charles
American Astronomical Society, Princeton, N.J.
Sep 1976 44p.; For related documents, see SE 021 773-776
Sponsoring Agency: National Aeronautics and Space Administration, Washington, D.C.; National Science Foundation, Washington, D.C.
Report No.: NASA-EP-129
Available from: Superintendent of Documents, U.S. Government Printing Office, Washington, D.C. 20402 (Stock Number 033-000-00657-8, $1.30)
EDRS Price - MF01/PC02 Plus Postage.
Document Type: CLASSROOM MATERIAL (050)
Journal Announcement: RIEMAY77
Target Audience: Practitioners
This booklet is part of an American Astronomical Society curriculum project designed to provide teaching materials to teachers of secondary school chemistry, physics, and earth science. The material is presented in three parts: one section provides the fundamental content of extragalactic astronomy, another section discusses modern discoveries in detail, and the last section summarizes the earlier discussions within the structure of the Big Bang Theory of Evolution. Each of the three sections is followed by student exercises and activities, laboratory projects, and questions and answers. The glossary contains unfamiliar terms used in the text and a collection of teacher aids such as literature references and audiovisual materials. (MH)
Descriptors: *Astronomy; Curriculum; *Instructional Materials; Science Education; *Scientific Research; Secondary Education; *Secondary School Science; *Space Sciences
Identifiers: National Aeronautics and Space Administration

ED133198 SE021774
**Chemistry Between The Stars.**
Gammon, Richard H.
American Astronomical Society, Princeton, N.J.
Sep 1976 66p.; For related documents, see SE 021 773-776; Photographs may not reproduce well
Sponsoring Agency: National Aeronautics and Space Administration, Washington, D.C.; National Science Foundation, Washington, D.C.
Report No.: NASA-EP-127
Available from: Superintendent of Documents, U.S. Government Printing Office, Washington, D.C. 20402 (Stock Number 033-000-00655-1, $1.60)
EDRS Price - MF01/PC03 Plus Postage.
Document Type: CLASSROOM MATERIAL (050)
Journal Announcement: RIEMAY77
Target Audience: Practitioners
This booklet is part of an American Astronomical Society curriculum project designed to provide teaching materials to teachers of secondary school chemistry, physics, and earth science. The following topics are covered: the physical conditions in interstellar space in comparison with those of the earth, particularly in regard to gas density, temperature, and radiation; the concept of quantized molecular motion (electronic, vibrational, rotational), and the corresponding energy ranges of radiation; spectroscopic methods for identifying molecules in space; the organic nature of interstellar chemistry; and application of our knowledge of interstellar molecules to study the birth of stars, the structure and movement of our galaxy, the history of interstellar matter, and the origin of the universe and life. Each section is followed by questions and answers, and an appendix contains suggested student projects. Also included are a glossary of terms and suggested reference materials. (MH)
Descriptors: *Astronomy; Chemical Analysis; *Chemistry; Curriculum; *Instructional Materials; Science Education; Scientific Research; Secondary Education; *Secondary School Science; *Space Sciences
Identifiers: National Aeronautics and Space Administration

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DIALOG File 1: ERIC - 66-85/JUN

ED133197 SE021773
**Atoms in Astronomy.**
Blanchard, Paul A.
American Astronomical Society, Princeton, N.J.
Sep 1976 42p.; For related documents, see SE 021 774-776
Sponsoring Agency: National Aeronautics and Space Administration, Washington, D.C.; National Science Foundation, Washington, D.C.
Report No.: NASA-EP-128
Available from: Superintendent of Documents, U.S. Government Printing Office, Washington, D.C. 20402 (Stock Number 033-000-00656-0, $1.20)
EDRS Price - MF01/PC02 Plus Postage.
Document Type: CLASSROOM MATERIAL (050)
Journal Announcement: RIEMAY77
Target Audience: Practitioners
This booklet is part of an American Astronomical Society curriculum project designed to provide teaching materials to teachers of secondary school chemistry, physics, and earth science. A Basic Topics section discusses atomic structure, emphasizing states of matter at high temperature and spectroscopic analysis of light from the stars. A section on Intermediate and Advanced Topics provides greater detail and more mathematical analysis of spectroscopy theory, including the quantum theory of electromagnetic radiation, electron orbits, and the classification of stellar spectra. Appendices include a glossary of unfamiliar terms, references and teaching aids, suggested class exercises, and questions and answers. (MH)
Descriptors: *Astronomy; *Atomic Structure; *Chemical Analysis; Chemistry; Curriculum; *Instructional Materials; Science Education; Secondary Education; *Secondary School Science; Space Sciences; *Spectroscopy
Identifiers: National Aeronautics and Space Administration

ED130911 SE021653
**An Attempt Towards Independent Study in Astronomy. Aids to Individualize the Teaching of Science, Mini-Course Units for Grades 7, 8, and 9.**
Geist, John E.
Frederick County Board of Education, Md.
1973 84p.; For related Mini-Course Units, see SE 021 624-656; Not available in hard copy due to marginal legibility of original document
Available from: Frederick County Board of Education, 115 East Church St., Frederick, MD 21701 (no price quoted)
EDRS Price - MF01 Plus Postage. PC Not Available from EDRS.
Document Type: CLASSROOM MATERIAL (050)
Journal Announcement: RIEMAR77
Target Audience: Practitioners
This booklet, one of a series developed by the Frederick County Board of Education, Frederick, Maryland, provides an instruction module for an individualized or flexible approach to 7th, 8th, and 9th grade science teaching. Subjects and activities in this series of booklets are designed to supplement a basic curriculum or to form a total curriculum, and relate to practical process oriented science instruction rather than theory or module building. Included in each booklet is a student section with an introduction, performance objectives, and science activities which can be performed individually or as a class, and a teacher section containing notes on the science activities, resource lists, and references. This booklet presents independent study of astronomy, astronomical instruments, the solar system, Earth time zones, and stars. The estimated time for completing the activities in this module is 8-9 weeks. (SL)
Descriptors: *Astronomy; Individualized Instruction; Instructional Materials; Junior High School Students; Minicourses; Process Education; *Science Education; Science Materials; Secondary Education; *Secondary School Science; *Space Sciences
Identifiers: Maryland (Frederick County)

ED128248 SO009316
**Statistics for Geography Teachers: Topics in Geography, Number 2.**
National Council for Geographic Education.
Jan 1967 38p.; For related documents, see SO 009 315 and 317
Available from: NCGE Central Office, 115 North Marion Street, Oak Park, Illinois 60301 ($1.00)
EDRS Price - MF01 Plus Postage. PC Not Available from EDRS.
Document Type: CLASSROOM MATERIAL (050)
Journal Announcement: RIEJAN77
Target Audience: Practitioners
This publication is designed to provide geography teachers with useful statistical information. It presents tables, maps, graphs, diagrams, and explanations of statistical data in 24 areas. The areas in which statistics are given are conversions, measurement, astronomy, time, daylight, twilight, latitude and longitude as distance, the relationship of latitude and area, physical comparisons, continental extremes, altitude effects, climate, motion, weather extremes, environmental limitations, urban area population, land usability, population characteristics, production and consumption of selected industrial commodities, energy, other economic and social measures, national economy measures, production rankings, and exports and imports. (AV)
Descriptors: Comparative Analysis; Data; Diagrams; *Educational Media; Elementary Secondary Education; Geography *Geography Instruction; Graphs; Higher Education; Maps; Statistical Analysis; *Statistical Data; *Statistics; Tables (Data); *Visual Aids

ED128212 SE021298
**Astronomy Educational Materials Addendum 1973-1976. Part A: Material in English.**
Swihart, Thomas L., Ed.
Feb 1976 8p.; For related document see SE021297; Not available in hard copy due to marginal legibility of original

(cont. next page)

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DIALOG File 1: ERIC - 66-85/JUN

document
Sponsoring Agency: Arizona Univ., Tucson. Seward Observatory.
EDRS Price - MF01 Plus Postage. PC Not Available from EDRS.
Language: ENGLISH
Document Type: BIBLIOGRAPHY (131)
Journal Announcement: RIEJAN77
This resource guide is a supplement, covering the years 1973-1976, to a compendium of astronomy educational materials published in 1970. The majority of the listings are books published in English that would be of use in astronomy education. Levels are classified as follows: general public, amateur astronomers, university science students, university nonscience students, and advanced material for research or graduate study. (MH)
Descriptors: *Astronomy; Bibliographies; *Books; *College Science; Higher Education; *Hobbies; Instructional Materials; *Resource Materials; Science Education

ED128211 SE021297
**Astronomy Educational Material Addendum 1970-1973. Part A: Material in English.**
Swihart, Thomas L., Ed.
Feb 1973 11p.; For related document see SE021298; Not available in hard copy due to marginal legibility of original document
Sponsoring Agency: Arizona Univ., Tucson. Seward Observatory.
EDRS Price - MF01 Plus Postage. PC Not Available from EDRS.
Language: ENGLISH
Document Type: BIBLIOGRAPHY (131)
Journal Announcement: RIEJAN77
This resource guide is an update, covering the years 1970-1973, to a compendium of astronomy educational materials published in 1970. Included are English-language materials of all kinds, and at all levels, which would be of interest in astronomy education. The materials are classified according to type and are graded according to level where appropriate. The types are: books, atlases, journals, lecture notes and exercises, films, filmstrips, photographs, and slides. Levels comprise the following classifications: general public, amateur astronomers, elementary school, secondary school, university science students, university nonscience students, and advanced material for research or graduate study. (MH)
Descriptors: *Astronomy; Bibliographies; *Books; College Science; Elementary Education; Elementary School Science; Films; Higher Education; Hobbies; *Instructional Materials; *Resource Materials; *Science Education; Secondary Education; Secondary School Science

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ED124431 SE020995
**NASA Facts, Mars as a Member of the Solar System.**
National Aeronautics and Space Administration, Washington, D.C. Educational Programs Div.
[1976 9p.; Photographs may not reproduce well
Report No.: NF-59/12-75
Available from: Superintendent of Documents, U.S. Government Printing Office, Washington, D.C. 20402 (Stock No. 033-000-00620-9, $0.35)
EDRS Price - MF01/PC01 Plus Postage.
Language: ENGLISH
Document Type: JOURNAL ARTICLE (080)
Journal Announcement: RIEOCT76
Presented is one of a series of National Aeronautics and Space Administration (NASA) facts about the exploration of Mars. In this publication, emphasis is placed on the planet Mars as a member of the Solar System and a detailed description is given related to historical accounts of the planet's existence and its travels. The physical characteristics are described as well as those of its satellites. Photographs as seen by Mariner 9 from space and diagramatic figures showing position and distances related to earth and sun are included in the article. Five student projects are given as well as suggested readings. (EB)
Descriptors: *Astronomy; Earth Science; *Instructional Materials; Science Education; Scientific Research; *Secondary School Science; *Space Sciences
Identifiers: *Mars (Planet); Solar System

ED124430 SE020994
**NASA Facts, Mars and Earth.**
National Aeronautics and Space Administration, Washington, D.C. Educational Programs Div.
[1975 9p.; Photographs may not reproduce well
Report No.: NF-61/8-75
Available from: Superintendent of Documents, U.S. Government Printing Office, Washington, D.C. 20402 (Stock No. 033-000-00621-7, $0.35)
EDRS Price - MF01/PC01 Plus Postage.
Language: ENGLISH
Document Type: JOURNAL ARTICLE (080)
Journal Announcement: RIEOCT76
Presented is one of a series of National Aeronautics and Space Administration (NASA) facts about the exploration of Mars. In this publication, emphasis is placed on the sun's planetary system with note made that there is no one theory for the origin and subsequent evolution of the Solar System that is generally accepted. Ideas from many scientists are pointed out. The planatary atmospheres, climates, and the search being made for extra terrestrial life are discussed in this particular series. Photographs, diagramatic schemes and a table representing the evolution of living systems on Earth are included. Student projects are suggested as well as a reading list. (EB)
Descriptors: *Astronomy; *Climate; *Earth Science; *Instructional Materials; Science Education; Scientific Research; *Secondary School Science; Space Sciences
Identifiers: *Earth; *Mars (Planet); Solar System

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DIALOG File 1: ERIC - 66-85/JUN

ED124429 SE020993
**NASA Facts, Mars as a Planet.**
National Aeronautics and Space Administration, Washington, D.C. Educational Programs Div.
[1976 13p.; Not available in hard copy due to marginal legibility
Report No.: NF-60/8-75
Available from: Superintendent of Documents, U.S. Government Printing Office, Washington, D.C. 20402 (Stock No. 033-000-00623-3, $0.35)
EDRS Price - MF01 Plus Postage. PC Not Available from EDRS.
Language: ENGLISH
Document Type: JOURNAL ARTICLE (080)
Journal Announcement: RIEOCT76
Presented is one of a series of National Aeronautics and Space Administration (NASA) facts about the exploration of Mars. Photographs, showing Mars as seen from Earth through a telescope, show dark markings and polar caps present. Photographs from Mariner 7, Mariner 4, and Mariner 9 are included. Presented is a composite of several Mariner 9 photographs that reveal the summit craters and the cliffs at the base of a high pile of lava, with an altitude trace scheme drawn across a mountain diagram. An explanation of the changes occurring on Mars on the basis of close-up observations by NASA's Mariner 9 is presented. Both the geology and atmosphere of Mars are described. A contour map showing the highest contours in kilometers above and below the level on Mars at which water can exist as a liquid is included. Student involvement is facilitated by the inclusion of three suggested activities and suggested readings. (EB)
Descriptors: Aerospace Technology; *Astronomy; Earth Science ; *Instructional Materials; Science Education; *Scientific Research; *Secondary School Science; *Space Sciences
Identifiers: *Mars (Planet); Solar System

ED124428 SE020992
**NASA Facts, The Viking Mission.**
National Aeronautics and Space Administration, Washington, D.C. Educational Programs Div.
[1976 13p.; Photographs may not reproduce well; Some small Print in charts
Report No.: NF-62/6-75
Available from: Superintendent of Documents, U.S. Government Printing Office, Washington, D.C. 20402 (Stock No. 033-000-00622-5)
EDRS Price - MF01/PC01 Plus Postage.
Language: ENGLISH
Document Type: JOURNAL ARTICLE (080)
Journal Announcement: RIEOCT76
Presented is one of a series of publications of National Aeronautics and Space Administration (NASA) facts about the exploration of Mars. The Viking mission to Mars, consisting of two unmanned NASA spacecraft launched in August and September, 1975, is described. A description of the spacecraft and their paths is given. A diagram identifying the five phases of the mission to Mars is presented. A diagram of the lander spacecraft and the orbiter spacecraft with the lander attached in cruise mode is included. Descriptive and pictoral views of landing sites and photographs taken with a Viking lander camera show some of the aspects of the science experiments being completed. A life detection experiment is explained in detail. Three student-oriented projects are given as well as a suggested reading list. (EB)
Descriptors: *Aerospace Education; Aerospace Technology; *Astronomy; Earth Science; *Instructional Materials; Research Science Education; *Scientific Research; *Secondary School Science; Space Sciences
Identifiers: *Mars (Planet); Solar System; *Viking Mission

ED124393 88 SE019616
**"Would You Like to Swing on a Star?" Minicourse, Career Oriented Pre-Technical Physics.**
Dallas Independent School District, Tex.
1974 28p.; For related documents, see SE 018 322-333 and SE 019 605-615
Sponsoring Agency: Bureau of Elementary and Secondary Education (DHEW/OE), Washington, D.C.
EDRS Price - MF01/PC02 Plus Postage.
Document Type: CLASSROOM MATERIAL (050)
Journal Announcement: RIEOCT76
Target Audience: Practitioners
This instructional guide, intended for student use, provides an exposure of career opportunities in space exploration. The program is developed with use of astronomy and earth science topics, while stressing technical aspects. NASA materials are also used extensively. Included in the minicourse are: (1) the rationale, (2) terminal behavioral objectives, (3) enabling behavioral objectives, (4) activities, (5) resource packages, and (6) evaluation materials. This unit is one of twelve intended for use in the second year of a two year vocationally oriented physics program. (CP)
Descriptors: Instructional Materials; Physics; *Program Guides; *Science Activities; Science Careers; Science Education; *Science Materials; Secondary Education; *Secondary School Science; *Space Sciences; Technical Education
Identifiers: Elementary Secondary Education Act Title III

ED116626 IR002858
**Japanese Science Films; a Descriptive and Evaluative Catalog of: 16mm Motion Pictures, 8mm Cartridges, and Video Tapes.**
Newren, Edward F., Ed.
American Science Film Association, Bethesda, Md.
Aug 1973 111p.
Sponsoring Agency: National Science Foundation, Washington, D.C.
EDRS Price - MF01/PC05 Plus Postage.
Language: ENGLISH
Document Type: BIBLIOGRAPHY (131)
Journal Announcement: RIEMAY76
(cont. next page)

DIALOG File 1: ERIC - 66-85/JUN

One hundred and eighty Japanese 16mm motion pictures, 8mm cartridges, and video tapes produced and judged appropriate for a variety of audience levels are listed in alphabetical order by title with descriptive and evaluative information. A subject heading list and a subject index to the film titles are included, as well as a sample of the evaluation form used, a list of the evaluation specialists, and a list of the evaluation sites. Among the 19 subject areas listed are: archeology, microbiology, oceanography, astronomy, and ornithology. Evaluation was based on content, audience suitability, structure, picture, sound, and photo technique. The film were identified as part of the U.S.-Japan Science Film Exchange Project. (Author/DS)

Descriptors: Bibliographies; Earth Science; Elementary School Science; Engineering Technology; *Films; *Foreign Language Films; Higher Education; Instructional Films; Mathematics; Meteorology; Physical Sciences; Physics; Resource Materials; Secondary School Science; *Videotape Recordings

Identifiers: Japan; *US Japan Science Film Exchange Project

ED114241# SE014660

**The Basic Mathematics of Astronomy: A Sourcebook for Science Teachers.**

Therkelsen, Edward Robert

1970 192p.; Ph.D. Dissertation, University of Denver

Available from: University Microfilms, 300 North Zeeb Road, Ann Arbor, Michigan 48106 (Order No. 70-26,400, MF-$7.50, Xerography-$15.00)

Document Not Available from EDRS.

Language: ENGLISH

Document Type: DISSERTATION (040)

Journal Announcement: RIEMAR76

An attempt was made in this study to determine if there was a need for a sourcebook of the basic mathematics of astronomy for secondary school science teachers. Science teachers involved and interested in the teaching of astronomy were located through letters to the superintendents of the 400 largest school districts in the United States. Names and addresses of 196 teachers were received, and a detailed questionnaire was sent to each to ascertain the need for a sourcebook and to determine relevant subject content. A 71.9 percent return of usable questionnaire data was received. A definite need was indicated by 116 of the 141 science teachers responding. Topics were selected from those suggested in the questionnaire responses. The teachers were also afforded the opportunity to add topics to the list provided, if they desired. These too were considered. The sourcebook was compiled and arranged in 10 chapters with each containing definitions, formulas, and sample problems. Topics included: Spherical Trigonometry, Spherical Coordinates, Rectangular Coordinates, Transformation of Coordinates, Special Star Positions, Eclipses, Planetary Data, Optics, Physics Laws, and Stellar Data. (Author/EB)

Descriptors: *Astronomy; Doctoral Dissertations; Educational Research; *Instructional Materials; *Mathematics; Mathematics Materials; Science Education; *Science Teachers; Secondary School Science; *Secondary School Teachers; Surveys

ED113154 SE019638

**Activities. A Collection of Things to Do at the Environmental Learning Center, Isabella, Minnesota.**

Environmental Learning Center, Isabella, Minn.

[1975 119p.; Occasional marginal legibility

EDRS Price - MF01/PC05 Plus Postage.

Document Type: CLASSROOM MATERIAL (050)

Journal Announcement: RIEFEB76

Target Audience: Practitioners

A collection of activities used successfully at the Environmental Learning Center in Isabella, Minnesota, are contained in this guide. Areas of study are perception and communication, mapping, weather, snow, soil, aquatics, trees, and animals. Within these areas is a number of related activities, each to be adapted to the appropriate grade level. The exercises contain a brief description with a statement of purpose. Equipment checklists indicate what the center furnishes, and what you are expected to provide. Procedures explain specifically how to go about each activity. A series of discussion questions serve as a follow up to the exercises. The lessons provide a degree of flexibility, so that they can be used when designing a resident program, or modified to accommodate individual or group needs. A number of the activities suggest the use of activity cards which can be reproduced from the lesson sample. Notebooks are also indicated as being important in most areas. Included in the appendix is a detailed account of available equipment at the center, including those items for camping, recreation, measuring, optics, astronomy, terrestrial needs, aquatic needs, test kits, and audiovisual aids. The bibliography contains a collection of materials used to develop environmentally oriented lessons. (BP)

Descriptors: Curriculum Guides; *Elementary Secondary Education; *Environmental Education; *Instructional Materials Learning Activities; Natural Resources; Outdoor Education; Resident Camp Programs; *Science Education; Student Projects; *Teaching Guides

ED111612 SE017449

**Spacecraft and Their Boosters. Aerospace Education I. Instructor Handbook.**

Air Univ., Maxwell AFB, Ala. Junior Reserve Office Training Corps.

Sep 1972 62p.; For the accompanying textbook, see SE 017 448

EDRS Price - MF01/PC03 Plus Postage.

Document Type: CLASSROOM MATERIAL (050)

Journal Announcement: RIEJAN76

Target Audience: Practitioners

This curriculum guide is prepared for the textbook entitled "Spacecraft and their Boosters," published in the Aerospace Education I series. Specific guidelines are provided for teachers on each chapter included in the textbook. The guidelines are organized in nine categories: objectives,

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**DIALOG File 1: ERIC - 66-85/JUN**

behavioral objectives, textbook outline, orientation, suggested key points, suggestions for teaching, instructional aids, projects, and further reading. Page references corresponding to the textbook are given for major concepts stressed. (PS)
Descriptors: *Aerospace Education; *Aerospace Technology; *Astronomy; Aviation Technology; Course Organization; Curriculum Guides; Energy; *Instructional Materials; National Defense; *Physical Sciences; Secondary Education; Teaching Guides; Unit Plan
Identifiers: Air Force Junior ROTC; *Spacecraft

ED111611 SE017448
**Spacecraft and their Boosters. Aerospace Education I.**
Coard, E. A.
Air Univ., Maxwell AFB, Ala. Junior Reserve Office Training Corps.
1972 200p.; Colored drawings may not reproduce clearly. For the accompanying Instructor Handbook, see SE 017 449
EDRS Price - MF01/PC08 Plus Postage.
Language: ENGLISH
Document Type: BOOK (010)
Journal Announcement: RIEJAN76
This book, one in the series on Aerospace Education I, provides a description of some of the discoveries that spacecraft have made possible and of the experience that American astronauts have had in piloting spacecraft. The basic principles behind the operation of spacecraft and their boosters are explained. Descriptions are also included on unmanned and manned spacecraft. Brief mention is made of space stations, reusable space vehicles, and spacecraft fitted with specialized equipment for planetary exploration. The book is designed for use in the Air Force Junior ROTC program. (PS)
Descriptors: *Aerospace Education; *Aerospace Technology; *Astronomy; Aviation Technology; Energy; *Instructional Materials; National Defense; *Physical Sciences; Secondary Education; Textbooks
Identifiers: Air Force Junior ROTC; *Spacecraft

ED111610 SE017447
**The Aerospace Environment. Aerospace Education I. Instructor Handbook.**
Air Univ., Maxwell AFB, Ala. Junior Reserve Office Training Corps.
Sep 1972 44p.; For the accompanying textbook, see SE 017 446
EDRS Price - MF01/PC02 Plus Postage.
Document Type: CLASSROOM MATERIAL (050)
Journal Announcement: RIEJAN76
Target Audience: Practitioners
This publication provides guidelines for teachers using the textbook entitled "Aerospace Environment," published in the Aerospace Education I series. Major categories included in each chapter are objectives, behavioral objectives, suggested outline, orientation, suggested key points, instructional aids, projects, and further reading. Background materials for major concepts stressed are included. Page references corresponding to the textbook are given where appropriate. A blank sheet is included after each chapter for recording teacher ideas. (PS)
Descriptors: *Aerospace Education; Aerospace Technology; *Astronomy; Aviation Technology; Course Organization; Curriculum Guides; Environment; *Instructional Materials; *Meteorology; National Defense; *Physical Sciences; Secondary Education; Teaching Guides; Unit Plan
Identifiers: *Air Force Junior ROTC

ED111609 SE017446
**Aerospace Environment. Aerospace Education I.**
Savier, D. S.; Smith, J. C.
Air Univ., Maxwell AFB, Ala. Junior Reserve Office Training Corps.
1972 140p.; Colored drawings may not reproduce clearly. For the accompanying Instructor Handbook, see SE 017 447
EDRS Price - MF01/PC06 Plus Postage.
Language: ENGLISH
Document Type: BOOK (010)
Journal Announcement: RIEJAN76
This book is one in the series on Aerospace Education I. It briefly reviews current knowledge of the universe, the earth and its life-supporting atmosphere, and the arrangement of celestial bodies in outer space and their physical characteristics. Chapter 1 includes a brief survey of the aerospace environment. Chapters 2 and 3 examine the composition of the earth's atmosphere, global weather patterns, and the role played by various forces in producing weather. Chapter 4 includes recent findings on the surface characteristics and features of the Moon. The final chapter contains a brief description of the instruments used by astronomers and examines the worlds of interplanetary, interstellar, and intergalactic space. The book is designed for use in the Air Force Junior ROTC program. (PS)
Descriptors: *Aerospace Education; Aerospace Technology; *Astronomy; Aviation Technology; Environment; *Instructional Materials; *Meteorology; National Defense; *Physical Sciences Textbooks
Identifiers: *Air Force Junior ROTC

ED107200 IR001638
**Two New Graphic Computer Dialogs for Teachers.**
Arons, Arnold; Bork, Alfred
California Univ., Irvine. Physics Computer Development Project.
5 Mar 1975 13p.
Sponsoring Agency: National Science Foundation, Washington, D.C.
EDRS Price - MF01/PC01 Plus Postage.
Language: ENGLISH
Document Type: PROJECT DESCRIPTION (141)
(cont. next page)

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**DIALOG File 1: ERIC - 66-85/JUN**

Journal Announcement: RIEOCT75
A pair of interactive computer-student dialogs developed for use primarily with elementary and high school teachers are described. The dialogs use graphic facilities for teaching about the sky as seen from the earth and about the phases of the moon. The primary aim is for the teachers to understand the nature of a scientific model, in this case the model of the phases of the moon, through a Socratic interaction with the computer. The dialogs are also being used by other university students. (Author/SK)
Descriptors: Astronomy; *Computer Assisted Instruction; *Computer Graphics; Computer Programs; Elementary School Teachers; High School Students; Inservice Teacher Education; Material Development; Science Education; Science Instruction; Secondary School Teachers
Identifiers: Interactive Systems; TERRA

ED106546 CE003716
**Career Activities in Science: Grades 7-12.**
Sleep, Gerald; And Others
Powell Public Schools, Wyo.
1974 360p.; For related volumes see CE 003 714-5 and CE 003 717-8
Sponsoring Agency: Wyoming State Dept. of Education, Cheyenne.
EDRS Price - MF01/PC15 Plus Postage.
Document Type: CLASSROOM MATERIAL (050)
Journal Announcement: RIEOCT75
Target Audience: Practitioners
The curriculum guide attempts to assemble select activities that represent skills related to careers in science. These learning activities are designed to give junior and senior high school students opportunities to explore concepts and processes in many science-related careers. The broad areas covered are biology, chemistry, physics, and earth science. Each area is divided into sub-topics with individual lessons that span junior and senior high school science activities. Biology includes ecology, genetics, microbiology, zoology, botany, and human biology. Chemistry examines both the structure and behavior of matter, chemical families, nuclear energy, organic chemistry, and measurement. Physics contains lessons in motion, energy, and mechanics. Lessons in earth science are concerned with earth, ancient earth history, atmosphere-weather, water and supply, determination of places and times, and astronomy. Each unit or sub-topic lists all possible careers relevant to that area, and each lesson is organized into grade level, activity, procedure, results, discussion of results, and, in some lessons, an application section. A bibliography concludes the guide. (JB)
Descriptors: Biology; Career Choice; *Career Education; Chemistry; *Curriculum Guides; Earth Science; Instructional Materials; Junior High Schools; Learning Activities; Occupational Information; Physics; *Science Activities; *Science Careers; Sciences; *Secondary Education; Secondary School Curriculum; Secondary School Science

ED105121 CE003381
**Engineering Aid 1 & C. Rate Training Manual.**
Naval Education and Training Command, Pensacola, Fla.
1974 513p.; 1964 edition revised
Report No.: NAVEDTRA-10635-B
Available from: Superintendent of Documents, U.S. Government Printing Office, Washington, D.C. 20402 (Stock Number 0502-053-1760)
EDRS Price - MF02/PC21 Plus Postage.
Document Type: CLASSROOM MATERIAL (050)
Journal Announcement: RIESEP75
Target Audience: Practitioners
The manual is written primarily to aid in the training of personnel to meet the professional qualifications of the engineering aid, first class and chief. In chapter one, the trainee becomes familiar with the rewards and responsibilities of an engineering aid. Chapter two deals with principles of SEABEE administration, the organization and responsibilities of personnel in the Operations Department of a Naval Mobile Construction Battalion, safety responsibilities, and the principles of the Personnel Readiness Capability Program. Chapters 3 through 15 deal with the technical subject matter of the engineering and rating (geodesy and field astronomy; triangulation; level and traverse computations; construction and land surveys; topographic surveys; horizontal and vertical curves; adjustment and repair of surveying equipment; drafting layout, checking, and editing; planning and estimating, estimator's catalogs and specifications; scheduling; soil mechanics; and quality control). Finally, chapter 16 is concerned with the public works organization, responsibilities, and procedures. (A subject index is provided.) (Author/BP)
Descriptors: Administrative Organization; Administrative Policy; Administrative Principles; Course Content; Engineering Education; *Engineering Technicians; *Engineering Technology; Guides; *Instructional Materials; Military Personnel; *Military Training; Seafarers; *Supervisory Training
Identifiers: Navy; *SEABEES

ED101929# SE016967
**Resident Outdoor Education Handbook. Revised, 1973.**
Ridgewood Public Schools, N.J.
1973 87p.; Marginal legibility
Available from: ERIC/SMEAC, The Ohio State University, 400 Lincoln Tower, Columbus, Ohio 43210 (on loan)
Document Not Available from EDRS.
Language: ENGLISH
Document Type: CLASSROOM MATERIAL (050)
Journal Announcement: RIEJUN75
This environmental education guide focuses on activities and topics which may be used in a school camping program. Although this guide was prepared for a specific school camp, the topics and activities included in the guide are applicable to many school camp situations. Such topics as the constellations,
(cont. next page)

pond exploration, birds, wildlife, forestry, plants, nature games, orienteering, geology, and nature crafts are included. The topics provide a variety of information; some provide background information and activities, others provide an outline for preparation at school, camp activities, and in-class follow up. Pictures, tables, tree keys, questions, problem solving activity ideas, evaluation forms, and information lists are included in this guide. (TK)

Descriptors: Astronomy; Biology; *Conservation Education; *Environmental Education; Geology; Instructional Materials; Learning Activities; Natural Resources; *Outdoor Education; *Resident Camp Programs; *Science Education; Teaching Guides; Zoology

ED096112# SE018005

**Capital Middle Schools Science Department, Preliminary List of Behavioral/Performance Objectives.**

Delaware State Dept. of Public Instruction, Dover.; Del Mod System, Dover, Del.

30 Jun 1973 60p.; Marginal legibility on entire document

Sponsoring Agency: National Science Foundation, Washington, D.C.

Report No.: NSF-GW-6703

Available from: ERIC/SMEAC, The Ohio State University, 400 Lincoln Tower, Columbus, Ohio 43210 (on loan)

Document Not Available from EDRS.

Language: ENGLISH

Document Type: CLASSROOM MATERIAL (050)

Journal Announcement: RIEJAN75

This monograph provides basic behavioral objectives designed for a middle school science curriculum. Emphasis is placed on the study of the living environment for students in grade five. This includes the study of plants, animals, the human body, and the use of the microscope, classification and the scientific method. Objectives for grade six are based on an introduction to the physical sciences. Such concepts or topics as simple machines, astronomy, light, magnetism, energy and rocks and minerals are presented. Grade seven students are given an opportunity to accomplish both behavioral and performance objectives in the field of life science. Emphasis is placed on principles of biology, continuation of life and primitive life. The curriculum includes the study of animals and plants, human biology and marine biology. Earth and space science are studied in grade eight. Objectives centered on astronomy, meteorology, geology and oceanography are emphasized here. The use of measurements, topographic maps, ideas of conservation and principles of chemistry are included. Included in all objectives are prerequisite objectives from elementary grades. In some instances, activities and assessments accompany specific objectives. (EB)

Descriptors: *Behavioral Objectives; Biology; *Curriculum Guides; Earth Science; Environmental Education; Instruction; *Instructional Materials; *Middle Schools; Science Education; *Secondary School Science; Teaching Guides

Identifiers: *Del Mod System

ED096098 SE016457

**A Navigation Compendium. Revised Edition.**

Naval Training Command, Pensacola, Fla.; Naval Training Publications Detachment, Washington, D.C.

1972 207p.

Report No.: NAVTRA-10494-A

Available from: Superintendent of Documents, U. S. Government Printing Office, Washington, D. C. 20420 (Stock No. 0502-052-4710; no price quoted)

EDRS Price - MF01/PC09 Plus Postage.

Language: ENGLISH

Document Type: CLASSROOM MATERIAL (050)

Journal Announcement: RIEJAN75

This unit of instruction was prepared for use in navigation study at the Officer Candidate School, the various Naval ROTC Units, and within the fleet. It is considered a naval text. It covers a wide and expanding subject area with brevity. Basic and elementary navigational terms and instruments are presented and described. The use of charts and publications which constitute a source of information which the navigator constantly uses are presented in detail. Such topics as tides and currents, basic and advanced electronic navigation systems, nautical astronomy, time and timepieces, sight reduction and celestial computations are included in the program. The appendixes include nautical charts, useful physical laws and trigonometric functions, extracts from various publications, and various forms of instruction from navigation workbooks. (EB)

Descriptors: Electronics; Instruction; *Instructional Materials; *Navigation; *Oceanography; Physics; Science Education; Teaching Guides; *Technical Education

Identifiers: Navy

ED094956 SE016611

**Earth and Space Science. A Guide for Secondary Teachers.**

Bolles, William H.; And Others

Pennsylvania State Dept. of Education, Harrisburg. Bureau of Curriculum Services.

1973 200p.

EDRS Price - MF01/PC08 Plus Postage.

Language: ENGLISH

Document Type: CLASSROOM MATERIAL (050)

Journal Announcement: RIEDEC74

Designed for use in Pennsylvania secondary school science classes, this guide is intended to provide fundamental information in each of the various disciplines of the earth sciences. Some of the material contained in the guide is intended as background material for teachers. Five units are presented: The Earth, The Oceans, The Space Environment, The Atmosphere, and The Exploration of Space. The course is organized so that students proceed from the familiar, everyday world to the atmosphere and the space environment. Teaching geology in the fall takes advantage of weather conditions which permit field study. The purpose of the Earth and Space

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DIALOG File 1: ERIC - 66-85/JUN

Science course is to encourage student behaviors which will be indicative of a broad understanding of man's physical environment of earth and space as well as an awareness of the consequences which could result from changes which man may effect. (PEB)
Descriptors: Aerospace Education; *Astronomy; *Curriculum Guides; *Earth Science; Geology; Laboratory Experiments; Oceanography; Science Activities; Science Education; *Secondary School Science
Identifiers: Pennsylvania

ED093617 SE017099
**Comet Kohoutek, 1973-1974, A Teachers' Guide with Student Activities.**
Chapman, Robert D.
National Aeronautics and Space Administration, Greenbelt, Md. Goddard Space Flight Center.
Sep 1973 47p.
EDRS Price - MF01/PC02 Plus Postage.
Language: ENGLISH
Document Type: CLASSROOM MATERIAL (050)
Journal Announcement: RIENOV74
This teacher's guide provides background information, curriculum source materials, and suggested class activities for class discussion and study. Information related to the discovery of the comet is presented as well as photographic and schematic pictures showing the sky through which the comet travels. Historical data regarding comets of the past and both ancient and modern views of comets is presented. The booklet presents a summary of the Comet Kohoutek events, a bibliography and a glossary. (EB)
Descriptors: *Astronomy; *Earth Science; Instruction; *Instructional Materials; *Science Activities; Science Education; *Teaching Guides

ED091216 SE017789
**Skylab Experiments, Volume 5, Astronomy and Space Physics.**
National Aeronautics and Space Administration, Washington, D.C.
May 1973 86p.; For related documents, see SE 016 464 and 465, SE 016 991, SE 017 106, SE 017 788, and SE 017 790
Report No.: EP-114
Available from: Superintendent of Documents, Government Printing Office, Washington, D.C. 20402
EDRS Price - MF01/PC04 Plus Postage.
Language: ENGLISH
Document Type: CLASSROOM MATERIAL (050)
Journal Announcement: RIESEP74
Basic knowledge about Skylab experiments is presented in this book, one of a series, for the purpose of informing high school teachers about scientific research performed in orbit and enabling the teachers to broaden their basis for material selection. This fifth volume is concerned with studies of our own and other galaxies and effects of solar radiation on Earth's atmosphere. The topics include the solar system, cosmic ray studies, stellar astronomy, spacecraft in space environment, radiation in spacecraft, ultraviolet airglow horizon photography, gegenschein/zodiacal light, particle collection, lunar libration clouds, objects within Mercury's orbit, x-rays from Jupiter, magnetospheric particle composition, cosmic ray nuclear emulsion, transuranic cosmic rays, neutron analysis, ultraviolet stellar astronomy and panorama, galactic x-ray mapping, spectrography of selected quasars, pulsars in the ultraviolet wavelengths, x-ray content in association with stellar, spectral classes, and contamination measurements. Experiment background, scientific objectives, relationships between the Skylab investigations and high school topics, and suggestions for classroom activities are provided. Included is a glossary of terms. (CC)
Descriptors: *Aerospace Technology; *Astronomy; *Instructional Materials; Pollution; Radiation; *Science Activities; Science Education; *Science Materials; Secondary School Science; Space Sciences
Identifiers: National Aeronautics and Space Administration; *Skylab Education Program

ED091153 SE016464
**Skylab Experiments, Volume I, Physical Science, Solar Astronomy.**
National Aeronautics and Space Administration, Washington, D.C.
May 1973 81p.; For related documents, see SE 016 465, SE 016 991, SE 017 106, and SE 017 788-790
Report No.: EP-110
Available from: Superintendent of Documents, Government Printing Office, Washington, D.C. 20402
EDRS Price - MF01/PC04 Plus Postage.
Language: ENGLISH
Document Type: CLASSROOM MATERIAL (050)
Journal Announcement: RIESEP74
Up-to-date knowledge about Skylab experiments is presented for the purpose of informing high school teachers about scientific research performed in orbit and enabling them to broaden their scope of material selection. The first volume is concerned with the solar astronomy program. The related fields are physics, electronics, biology, chemistry, and photography, especially dealing with electromagnetic spectra, atomic structures, x-ray absorption, radiation, and kinetic theory. The content includes discussions of basic scientific background, a description of the sun and of the energy characteristics associated with each zone, and experiments with hydrogen-alpha telescopes, white light coronagraphy, extreme ultraviolet spectrograph and spectroheliograph, scanning polychromator, x-ray spectrographic camera, solar photography, and x-ray telescopes. Related curriculum topics and classroom demonstrations and activities are provided in detail. (CC)
Descriptors: *Aerospace Technology; *Astronomy; Demonstrations (Educational); *Instructional Materials;
(cont. next page)

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DIALOG File 1: ERIC - 66-85/JUN

*Interdisciplinary Approach; Science Activities; Science Education; *Science Experiments; Science Materials; Secondary School Science
Identifiers: National Aeronautics and Space Administration; *Skylab Education Program

ED082960 SE015972
**Articulated Multimedia Physics, Lesson 9, Universal Gravitation.**
New York Inst. of Tech., Old Westbury.
[1965 131p.
EDRS Price - MF01/PC06 Plus Postage.
Language: ENGLISH
Journal Announcement: RIEFEB74
As the ninth lesson of the Articulated Multimedia Physics Course, instructional materials relating to universal gravitation are presented in this study guide. The subject is concerned with the quantitative meaning of the law of universal gravitation and its applications in astronomy. The content is arranged in scrambled form, and the use of matrix transparencies is required for students to control their learning activities. Students are asked to use magnetic tape playback, instructional tapes, and single concept films at the appropriate place in conjunction with the worksheet. Included are a homework problem set, a study guide slipsheet, and illustrations for explanation purposes. Related documents are SE 015 963 through SE 015 977. (CC)
Descriptors: *College Science; Computer Assisted Instruction; *Instructional Materials; *Mechanics (Physics); *Multimedia Instruction; Physics; Science Education; *Study Guides; Supplementary Reading Materials; Textbooks

ED077653 SE015165
**Science Selections. Accounts of Ongoing Scientific Research.**
Kornberg, Warren, Ed.
National Science Teachers Association, Washington, D.C.
1972 59p.
Available from: NSTA, 1201 Sixteenth Street, N.W., Washington, D.C. 20036 (Stock No. 471-14632, $0.20 minimum order of five copies)
EDRS Price - MF01 Plus Postage. PC Not Available from EDRS.
Language: ENGLISH
Journal Announcement: RIEOCT73
This publication is intended to present science teachers with an opportunity to communicate to students the idea that science is an ongoing and never-ending process. The booklet contains supplemental materials, valuable as enrichment materials. A selection of ongoing research in the biological sciences, physics and astronomy, oceanography, meteorology, paleontology, anthropology and the social sciences is presented. Additional readings associated with the work of the scientists involved in the research projects are included. The articles are a part of a coordinated package of materials designed to include film as well as text, originally prepared by Warren Kornberg of the National Science Foundation and authenticated by the scientists directly involved in the research. (EB)
Descriptors: Biological Sciences; Earth Science; Environmental Education; *Instructional Materials; Physical Sciences; *Research Projects; *Resource Materials; *Science Education; *Scientific Research; Secondary School Science
Identifiers: National Science Teachers Association

ED071891 SE015528
**Project Physics Teacher Guide 2, Motion in the Heavens.**
Harvard Univ., Cambridge, Mass. Harvard Project Physics.
1968 346p.; Authorized Interim Version
Sponsoring Agency: Office of Education (DHEW), Washington, D.C. Bureau of Research.
Bureau No.:BR-5-1038
Contract No.: OEC-5-10-058
EDRS Price - MF01/PC14 Plus Postage.
Language: ENGLISH
Journal Announcement: RIEMAY73
Teaching procedures of Project Physics Unit 2 are presented to help teachers make effective use of learning materials. The unit contents are discussed in connection with teaching aid perspectives, multi-media schedules, schedule blocks, and resource charts. Analyses are made for transparencies, 16mm films, and reader articles. Included is information about the background and development of each unit chapter, demonstration methods, apparatus operations, notes on the student handbook, and explanation of film loops. Additional articles deal with calendars, armillary sphere, epicycles, "chase problem," atmospheric refraction, relations in an ellipse, moon's irregular motion, initial and gravitational mass, G measuring, and "true" scale of sun, moon, and earth. A redesigned epicycle machine is analyzed, and a bibliography of reference texts and periodicals is given. Solutions to study guide problems in the text and review problems in the handbook are provided in detail along with suggested answers to test items. The second unit of the text, with marginal notes on each section, is also compiled in this guide. The work of Harvard Project Physics has been financially supported by: the Carnegie Corporation of New York, the Ford Foundation, the National Science Foundation, the Alfred P. Sloan Foundation, the United States Office of Education, and Harvard University. (CC)
Descriptors: *Astronomy; Instructional Materials; *Multimedia Instruction; Physical Sciences; *Physics; Science Activities; Secondary Education; *Secondary School Science; *Teaching Guides
Identifiers: Harvard Project Physics

ED071890 SE015527
**Project Physics Text 2, Motion in the Heavens.**
Harvard Univ., Cambridge, Mass. Harvard Project Physics.
1968 146p.; Authorized Interim Version
(cont. next page)

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**DIALOG File 1: ERIC - 66-85/JUN**

Sponsoring Agency: Office of Education (DHEW), Washington, D.C. Bureau of Research.
Bureau No.:BR-5-1038
Contract No.: OEC-5-10-058
EDRS Price - MF01/PC06 Plus Postage.
Language: ENGLISH
Journal Announcement: RIEMAY73

Astronomical fundamentals are presented in this unit of the Project Physics text for use by senior high students. The geocentric system of Ptolemy is discussed in connection with Greek concepts including Aristarchus' heliocentric hypothesis. Analyses are made of Copernicus' reexamination, leading to Tycho's observations and compromise system. A new universe is introduced by using Kepler's laws and Galileo's work. Terrestrial and celestial dynamics are synthesized by reviewing Newton's concepts about motions under central forces, inverse-square law, and earthly motions; and application of Newton's theories to heavenly events are discussed. The text unit is concluded by an explanation of the making of theories. Historical developments are stressed to help students understand the way in which science influences man's activities. Also included in the unit are a chart of renowned people's life spans in the emerging Renaissance culture and tables of planets and their satellites. Problems with their answers are provided in two categories: study guide and end of section questions. Besides illustrations for explanation purposes, a glossary of general terms is given in the appendix. The work of Harvard Project Physics has been financially supported by: the Carnegie Corporation of New York, the Ford Foundation, the National Science Foundation, the Alfred P. Sloan Foundation, the United States Office of Education, and Harvard University. (CC)

Descriptors: *Astronomy; Instructional Materials; Physical Sciences; *Physics; Science Activities; *Scientific Concepts; Secondary Education; Secondary School Science; *Textbooks
Identifiers: Harvard Project Physics

ED071889 SE015526
**Project Physics Handbook 2, Motion in the Heavens.**
Harvard Univ., Cambridge, Mass. Harvard Project Physics.
1968 81p.; Authorized Interim Version
Sponsoring Agency: Office of Education (DHEW), Washington, D.C. Bureau of Research.
Bureau No.:BR-5-1038
Contract No.: OEC-5-10-058
EDRS Price - MF01/PC04 Plus Postage.
Language: ENGLISH
Journal Announcement: RIEMAY73

Nine experiments and 17 activities are presented in this handbook. The experiments are related to the earth's size and orbit, Piton height, telescope operations, Mars and Mercury orbits, stepwise approximation, and models of comet orbits. Further naked-eye observations in astronomy are designed in connection with the sun, moon, and planet positions. The activities are concerned with sunspots, Foucault pendulum, three-dimensional orbits, satellite and comet orbits, Galileo's work, forces on a pendulum, angular measurements, analemma, epicycles, retrograde motions, armillary sphere, sidereal days, scale model of the solar system, and summary of physics learning in the Japanese haiku form. Self-directed instruction, demonstrations, and construction projects are stressed in these activities. The four chapters in the handbook are arranged to correspond to the text materials, with complete instructions in each experiment. Some experiments and activities are suggested for assignment, and the remaining are used at student discretion. Besides illustrations and film loop notes for explanation use, a table of planet longitudes, a guide for planet and eclipse observations, and a set of review problems are included. Additional suggestions for activities are given in the appendix. The work of Harvard Project Physics has been financially supported by: the Carnegie Corporation of New York, the Ford Foundation, the National Science Foundation, the Alfred P. Sloan Foundation, the United States Office of Education, and Harvard University. (CC)

Descriptors: *Astronomy; Instructional Materials; *Laboratory Experiments; Laboratory Manuals; *Physics; *Science Activities; Science Experiments; Secondary Education *Secondary School Science
Identifiers: Harvard Project Physics

ED071888 SE015525
**Project Physics Tests 2, Motion in the Heavens.**
Harvard Univ., Cambridge, Mass. Harvard Project Physics.
1968 26p.; Authorized Interim Version
Sponsoring Agency: Office of Education (DHEW), Washington, D.C. Bureau of Research.
Bureau No.:BR-5-1038
Contract No.: OEC-5-10-058
EDRS Price - MF01/PC02 Plus Postage.
Language: ENGLISH
Journal Announcement: RIEMAY73

Test items relating to Project Physics Unit 2 are presented in this booklet. Included are 70 multiple-choice and 22 problem-and-essay questions. Concepts of motion in the heavens are examined for planetary motions, heliocentric theory, forces exerted on the planets, Kepler's laws, gravitational force, Galileo's work, satellite orbits, Jupiter's moons, Tycho's observations, stellar parallax, and historical descriptions in astronomy. Suggestions are made for time consumption in answering some items. Besides directions and illustrations for explanation purposes, related physical constants and equations are provided. The work of Harvard Project Physics has been financially supported by: the Carnegie Corporation of New York, the Ford Foundation, the National Science Foundation, the Alfred P. Sloan Foundation, the United States Office of Education, and Harvard University. (CC)

Descriptors: *Achievement Tests; *Astronomy; Evaluation; Instructional Materials; Multiple Choice Tests; Physical

(cont. next page)

**DIALOG File 1: ERIC - 66-85/JUN**

Sciences; *Physics; Secondary Education; *Secondary School Science; *Testing
Identifiers: Harvard Project Physics

ED071887 SE015524
**Project Physics Reader 2, Motion in the Heavens.**
Harvard Univ., Cambridge, Mass. Harvard Project Physics.
1968 233p.; Authorized Interim Version
Sponsoring Agency: Office of Education (DHEW), Washington, D.C. Bureau of Research.
Bureau No.:BR-5-1038
Contract No.: OEC-5-10-058
EDRS Price - MF01/PC10 Plus Postage.
Language: ENGLISH
Journal Announcement: RIEMAY73
As a supplement to Project Physics Unit 2, specially selected articles are presented in this reader for student browsing. Eight excerpts are given under headings: the starry messenger, Newton and the principia, an appreciation of the earth, space the unconquerable, "Is there intelligent life beyond the earth?," the life story of a galaxy, expansion of the universe, and Dyson sphere. Seven book passages are included under the headings of the black cloud, roll call, a night at the observatory, Kepler's celestial music, universal gravitation, a table of stars within twenty-two light years that could have habitable planets, and three poetic fragments about astronomy. The remaining articles include a preface to the books of the revolutions, Kepler, Kepler on Mars, laws of motion and proposition one, garden of Epicurus, a search for life on earth at Kilometer resolution, the boy who redeemed his father's name, great comet of 1965, gravity experiments, unidentified flying objects, and negative mass. Illustrations for explanation purposes are provided. The work of Harvard Project Physics has been financially supported by: the Carnegie Corporation of New York, the Ford Foundation, the National Science Foundation, the Alfred P. Sloan Foundation, the United States Office of Education, and Harvard University. (CC)
Descriptors: Astronomy; Instructional Materials; *Motion; *Physics; Science Fiction; Science Materials; Secondary Education; *Secondary School Science; *Space; *Supplementary Reading Materials
Identifiers: Harvard Project Physics

ED071884 SE015521
**Project Physics Handbook 1, Concepts of Motion.**
Harvard Univ., Cambridge, Mass. Harvard Project Physics.
1968 73p.; Authorized Interim Version
Sponsoring Agency: Office of Education (DHEW), Washington, D.C. Bureau of Research.
Bureau No.:BR-5-1038
Contract No.: OEC-5-10-058
EDRS Price - MF01/PC03 Plus Postage.
Language: ENGLISH
Journal Announcement: RIEMAY73
Thirteen experiments and 15 activities are presented in this unit handbook for student use. The experiment sections are concerned with naked-eye observation in astronomy, regularity and time, variations in data, uniform motion, gravitational acceleration, Galileo's experiments, Netson's laws, inertial and gravitational mass, trajectories, and circular motion. Suggestions for demonstrations, construction projects, and self-directed instructions are given in the activity sections to deal with aspects of stroboscopes, frictionless pucks, air resistance, time determination, falling weights, accelerometers, projectile motion, motion in a rotating reference frame, centripetal forces, and harmonograms. Methods of keeping records, using the Polaroid Camera, and physics readers are discussed in the introductory section. The four chapters in the handbook are designed to correspond to the text, with complete instructions in each experiment. Some experiments and activities are suggested in assignments, and the remaining are open to students' free selection. Illustrations and film loop notes for explanation purposes are included. Additional suggestions for activities, a guide for planet and eclipse observations, and the best time for viewing meteor showers are also provided as appendices. The work of Harvard Project Physics has been financially supported by: the Carnegie Corporation of New York, the Ford Foundation, the National Science Foundation, the Alfred P. Sloan Foundation, the United States Office of Education, and Harvard University. (CC)
Descriptors: *Experimental Teaching; Force; Instructional Materials; Kinetics; *Laboratory Experiments; *Motion; *Physics; Science Activities; Secondary Education; Secondary School Science; Time
Identifiers: Harvard Project Physics

ED069555# SE015448
**Nuffield Secondary Science, Theme 8, The Earth and Its Place in the Universe.**
Leigh, R.
Nuffield Foundation, London (England).
1971 265p.
Available from: Longman Group Limited, 74 Grosvenor Street, London W1, England
Document Not Available from EDRS.
Language: ENGLISH
Journal Announcement: RIEMAR73
Nuffield Secondary Science is a set of tested materials from which teachers can prepare courses for students in grades 9-11 (approximately) who do not intend to major in science. The materials are designed for British secondary schools but are adaptable for other countries. The Teachers' Guide to the entire set of materials is described in SE 015 440 and the nature of the Themes summarized in SE 015 441. Theme 8 contains the following fields of study (with subsidiary sections indicated in parentheses): Getting Away from the Earth (rocketry, orbits, projectiles, effects of friction,
(cont. next page)

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DIALOG File 1: ERIC - 66-85/JUN

gravitational fields); The Solar System and Beyond (environment of Earth, Earth in space, the Moon, planets, Sun and other stars, man in space); The Weather (the atmosphere, factors causing weather phenomena, sequence of weather patterns, effects of weather on everyday lives); The Earth's Crust (basic questions, examples of field-based teaching schemes, suggestions for follow-up work). See also SE 015 442 to SE 015 447. (AL)

Descriptors: *Astronomy; *Earth Science; Field Studies; Instruction; Instructional Materials; *Meteorology; Science Activities; Secondary School Science; *Space Sciences; *Teaching Guides

Identifiers: *Nuffield Project

ED066931 24 EM010365

**A Summary of Plato Curriculum and Research Materials.**

Lyman, Elisabeth R.

Illinois Univ., Urbana. Computer-Based Education Lab.

Aug 1972 52p.

Sponsoring Agency: Office of Education (DHEW), Washington, D.C. Bureau of Research.

Bureau No.:BR-5-1179

Contract No.: OEC-6-10-184

Report No.: CERL-R-X-23

EDRS Price - MF01/PC03 Plus Postage.

Language: ENGLISH

Journal Announcement: RIEJAN73

PLATO (programmed Logic for Automatic Teaching Operations) is a computer-based teaching system which was developed in the Coordinated Science Laboratory at the University of Illinois to explore the possibilities of automation in individual instruction. The history of the PLATO program is summarized here, along with a list of courses which used PLATO during the academic year 1971-72. A summary by subject area of information about PLATO materials used by students either in the past or at present describes PLATO curriculum materials in the many fields, including accounting, astronomy, medicine, biology, foreign languages, engineering, mathematics, urban planning, and veterinary medicine. A chronological bibliography of all PLATO publications is also provided. (JY)

Descriptors: College Instruction; *Computer Assisted Instruction; *Computer Programs; *Instructional Materials; Program Descriptions

Identifiers: *PLATO

ED065345 SE014423

**Outdoor Education Resource Guide.**

Prince George's County Board of Education, Upper Marlboro, Md.

1970 264p.

EDRS Price - MF01/PC11 Plus Postage.

Language: ENGLISH

Journal Announcement: RIENOV72

Developed primarily as a source of information for teachers planning outdoor education experiences, the material in this resource book can be used by any teacher in environmental studies. Subjects and activities most often taught as part of the outdoor education program are outlined both as resource (basic information) and teaching units. The teaching units suggest pre-camp, camp, and post-camp activities, indicating materials required and procedures to follow for the activities. Topics include: insects, woodland community, shoreline ecology, weather, astronomy, stalking and observing, mapping and orienteering, creative arts, nature crafts, survival and campcrafts, water safety and recreation, and campfire programs. A bibliography accompanies each unit together with information specific to the outdoor education program of the Prince George's County public schools. (BL)

Descriptors: *Elementary Education; Environmental Education *Instructional Materials; Learning Activities; Natural Resources; *Outdoor Education; *Teaching Guides

ED064090 SE013663

**Skylab, Space Shuttle, Space Benefits Today and Tomorrow.**

National Aeronautics and Space Administration, Washington, D.C.

1972 15p.

EDRS Price - MF01/PC01 Plus Postage.

Language: ENGLISH

Journal Announcement: RIEOCT72

The pamphlet "Skylab" describes very generally the kinds of activities to be conducted with the Skylab, America's first manned space station. "Space Shuttle" is a pamphlet which briefly states the benefits of the Space Shuttle, and a concise review of present and future benefits of space activities is presented in the pamphlet "Space Benefits Today and Tomorrow." (PR)

Descriptors: Aerospace Education; *Aerospace Technology; Astronomy; *Earth Science; *Federal Programs; Instructional Materials; Pamphlets

ED064076# SE013616

**Giant Steps Through Science, Science I.**

Bertke, Mary Christopher; Feistritzer, Emily

1970 256p.; Preliminary Edition

Available from: ERIC/SMEAC, 1460 West Lane Avenue, Columbus, Ohio 43221 (on loan)

Document Not Available from EDRS.

Language: ENGLISH

Journal Announcement: RIEOCT72

This text is designed for use in a first year high school science course and is an attempt to put basic physical science concepts into a logical order. This organization involves an historical approach, beginning with four chapters on astronomy: Modern Astronomy, The Ancient Astronomers, Astronomy - Ptolemy to Kepler, and Galileo and Newton. The concepts of electricity and magnetism are presented in the next two chapters in preparation for the final two chapters on

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atomic theory. Located in the back of the text are 24 laboratory investigations intended to give the student opportunities to investigate the same questions that concerned the early scientists. (PR)
Descriptors: Astronomy; Atomic Theory; Electricity; Instructional Materials; Magnets; *Physical Sciences; Science Activities; *Science History; *Secondary School Science; *Textbooks

ED064020# RC006249
**Outdoor Education Manual.**
Ontario Teachers' Federation, Toronto.
1970 94p.
Available from: Ontario Teachers' Federation, Suite 550, 1260 Bay Street, Toronto 185, Ontario ($2.00)
Document Not Available from EDRS.
Language: ENGLISH
Journal Announcement: RIEOCT72
A guide and introduction to outdoor education for the classroom teacher, the manual lists 5 aims and objectives of outdoor education and discusses the means for reaching these objectives through field trips, camping, outdoor learning centers, and outdoor teaching in school environs. Selected activities are described by subject area: arts and crafts, geography and outdoor studies, surveying, history, exploring old cemeteries, language arts, mathematics, orienteering (direction-finding), physical education, and science. Reference materials are included. (PS)
Descriptors: *Art Activities; Astronomy; Camping; Conservation Education; Ecology; Geography; Handicrafts; *Instructional Materials; Language Instruction; Meteorology; *Outdoor Education; *Physical Education; *Science Instruction Trails

ED063984 RC006167
**Raleigh County Schools, Outdoor Education: Conference & Service Complex.**
Raleigh County Schools, Beckley, W. Va.
[1970 169p.
EDRS Price - MF01/PC07 Plus Postage.
Language: ENGLISH
Journal Announcement; RIEOCT72
A proposed Outdoor Education Conference and Service Complex in Raleigh County, West Virginia, that will offer opportunities for an outdoor education program closely correlated with classroom activities is discussed in this document. The site is described, and suggested units for study during the resident program for 6th-grade pupils are presented in the areas of language arts, life science, mathematics, social studies, astronomy, earth science, music, and physical education. Information concerning the development of a school museum is also provided. (PS)
Descriptors: Astronomy; Biological Sciences; *Camping; *Curriculum Development; Earth Science; *Inservice Teacher Education; *Instructional Materials; Language Arts; Mathematics; Music; *Outdoor Education; Physical Education; Social Sciences

ED061002 88 RC006048
**Pima Cultural Background Materials for an Elementary and Secondary Education Act Title III Project.**
Brook, Weston L., Comp.; And Others
Arizona State Univ., Tempe. Bureau of Educational Research and Services.; Bureau of Indian Affairs (Dept. of Interior), Sacaton, Ariz. Pima Indian Agency.
May 1970 108p.
Sponsoring Agency: Office of Education (DHEW), Washington, D.C. Projects to Advance Creativity in Education.
Available from: Bureau of Educational Research and Services, Arizona State University, Tempe, Arizona 85281 ($5.00 in Xeroxed form)
EDRS Price - MF01/PC05 Plus Postage.
Language: ENGLISH
Journal Announcement: RIEJUL72
Produced with funds under Title III of the Elementary and Secondary Education Act, this unit on Pima cultural background and Middle American civilization was designed to help Pima students achieve a sense of identity and pride in their Indian background by (1) thinking of themselves as a people with a long history and (2) learning that their culture is part of Indian civilization. It is noted that this unit, which supplements the study of Ancient History, is divided into 4 parts: Prehistory, which includes a discussion of the development of agriculture; The Mayas, which discusses intellectual contributions in astronomy, mathematics, writing, and art; People of the Valley of Mexico, which describes their organized way of life (e.g., large irrigation projects, cities, armies, and empires); and The Hohokam, which describes the prehistoric people of Arizona. The unit contains both a student booklet and a teaching guide for each of the 4 parts. A bibliography is also provided for each part of the unit, and student booklets, slides, transparencies, and movies are cited. (PS)
Descriptors: Agriculture; *American Indians; Art; *Cultural Awareness; Handicrafts; *History; *Instructional Materials; Learning Activities; Religion; *Teaching Guides
Identifiers: Pima (Tribe)

ED059041 SE013151
**Space Station: Key to the Future.**
National Aeronautics and Space Administration, Washington, D.C.
[1971 44p.
Report No.: NASA-EP-75
Available from: Superintendent of Documents, Government Printing Office, Washington, D.C. 20402 ($0.45)
EDRS Price - MF01/PC02 Plus Postage.
Language: ENGLISH

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**DIALOG File 1: ERIC - 66-85/JUN**

Journal Announcement: RIEMAY72
The possible applications, advantages and features of an advanced space station to be developed are considered in a non-technical manner in this booklet. Some of the areas of application considered include the following: the detection of large scale dynamic earth processes such as changes in snow pack, crops, and air pollution levels; the development of new industrial processing and technology in space, such as metal foam, growing crystals, and levitation melting; scientific research in astronomy, life science, and physics. The space station design and environment as well as the space shuttle transportation system are described. Many large drawings illustrate the space station and its operation. (PR)
Descriptors: *Aerospace Education; *Aerospace Technology; *Astronomy; Earth Science; Instructional Materials; Resource Materials; *Space Sciences
Identifiers: Space Age

ED054927 SE011306
**How Far a Star. A Supplement in Space Oriented Concepts for Science and Mathematics Curricula for Intermediate Grades.**
Maben, Jerrold William
National Aeronautics and Space Administration, Washington, D.C.
1969 112p.
Sponsoring Agency: Office of Education (DHEW), Washington, D.C.
EDRS Price - MF01/PC05 Plus Postage.
Language: ENGLISH
Journal Announcement: RIEJAN72
Space science-oriented concepts and suggested activities are presented for intermediate grade teachers of science and mathematics in a book designed to help bring applications of space-oriented mathematics into the classroom. Concepts and activities are considered in these areas: methods of keeping time (historically); measurement as related to time, distance, and astronomy, including lunar photographs and measurement activities; communication in space, sound, and satellites; measuring the atmosphere; and measuring and interpreting the light from stars. A glossary of space terms, an aerospace bibliography, and a subject index are included. (PR)
Descriptors: *Aerospace Technology; *Astronomy; Instructional Materials; *Intermediate Grades; *Mathematics; Measurement; Resource Materials; *Science Activities; Scientific Principles

ED052940# SE010933
**Probing the Natural World, Volume 3B, What's Up-Well Being-In Orbit.**
Burkman, Ernest
Florida State Univ., Tallahassee.
1970 527p.
Sponsoring Agency: Bureau of Elementary and Secondary Education (DHEW/OE), Washington, D.C.
Available from: Silver Burdett Company, Morristown, New Jersey
Document Not Available from EDRS.
Language: ENGLISH
Journal Announcement: RIENOV71
This book is the second of three experimental editions for use in the ninth grade portion of the Intermediate Science Curriculum Study (ISCS) Program. The volume is divided into three units: "In Orbit," "Well Being," and "What's Up." The unit, "In Orbit," consists of eight chapters of activities related to the properties of sun light, the use of spectrums and spectroscopes, the heat and energy of the sun, the measurement of astronomical distances, and the size of the sun and other similar topics. There are 15 excursion activities provided in this unit. The second unit, "Well Being," is concerned with the student's physical and mental health, including extensive exploration of the effects of drugs, various narcotics, alcohol, and tobacco smoke. There are 12 excursions included with the six chapters of this unit. The final unit consists of 10 chapters of activities dealing with rocketry and moon exploration and includes 21 excursions. The text is student-activity-oriented, and is designed for independent study and self pacing by the student, making it possible for the teacher to work individually with students. The excursions are optional activities providing more depth or side lights to the chapter materials. "The work was developed with support from the United States Office of Education (USOE) and published under 'limited' copyright authorization prusuant to the procedures of the USOE Copyright Guidelines." (PR)
Descriptors: Aerospace Technology; *Astronomy; *Drug Abuse; *Individualized Instruction; *Instructional Materials; Narcotics; Science Activities; *Secondary School Science; Space
Identifiers: Intermediate Science Curriculum Study

ED046786# SE010768
**An Identification of Earth Science Principles Pertinent to the Junior High School Programs, and an Analysis of the Eighth Grade Alabama Textbooks in Terms of the Principles Contained Therein.**
Henson, Kenneth Tyrone
1969 191p.
Available from: University Microfilms, 300 North Zeeb Rd., Ann Arbor, Michigan 48106 (Order No. 70-9354, Microfilm $3.00, Xerography $8.80)
Document Not Available from EDRS.
Language: ENGLISH
Journal Announcement: RIEMAY71
The purpose of this study was to identify the earth science principles pertinent to current programs in general education at the junior high level, and to determine whether selected textbooks provide adequate representation of those principles. There were 121 principles identified as being essential to the understanding of these five earth science areas: astronomy, geology, meteorology, oceanography, and physical geography.
(cont. next page)

**DIALOG File 1: ERIC - 66-85/JUN**

From these principles 108 were selected as being pertinent to the general education program in junior high school. The findings indicate that Alabama earth science textbooks do not adequately represent principles pertinent to the understanding of the five earth science areas. (PR)
Descriptors: Doctoral Dissertations; *Earth Science; Evaluation; *Instructional Materials; *Scientific Principles; *Secondary School Science; *Textbook Evaluation; Textbooks

ED045343 SE008973
**Relating Aerospace to Physical Science Grades 7-12.**
Williams, Mary H.; Rademacher, Jean
Lincoln Public Schools, Nebr.
Sep 1968 129p.
Sponsoring Agency: Bureau of Elementary and Secondary Education (DHEW/OE), Washington, D.C.
EDRS Price - MF01 Plus Postage. PC Not Available from EDRS.
Language: ENGLISH
Journal Announcement: RIEAPR71
This guide is intended to provide the teacher of secondary school physical science classes with a source of information about recent applications, discoveries, and innovations in aerospace. Each section of the guide is subdivided into parts in which objectives are listed, background information for the use of the teacher and/or the student is presented, and activities are suggested. Where problems involving numerical calculation are provided, answers are given. Sections on astronomy, earth science, units of measurement, heat and heat engines, sound and light, electricity, atomic and nuclear physics, and chemistry are included. Each section has a number of subsections, each dealing with a single topic. At the end of each section is a list of resource materials including books, films and other media. The resource lists are collected into a general bibliography, and a list of distributors and publishers is appended. Not available in hardcopy due to marginal legibility of original document. This work was prepared under an ESEA Title III contract. (Author/AL)
Descriptors: *Aerospace Technology; *Instructional Materials; Lesson Plans; Objectives; *Physical Sciences; *Secondary School Science; Teaching Guides
Identifiers: Elementary Secondary Education Act Title III

ED044300 SE010111
**High Interest - Low Vocabulary Science Books, Reading Level Grades 1-4 (Prepared for the Remedial Reading Teacher).**
Gott, Margaret E., Comp.; Wailes, James R., Comp.
Colorado Univ., Boulder. School of Education.
Sep 1970 60p.
Available from: Bureau of Educational Research, School of Education, Univ. of Colorado, Boulder, Colorado 80302 ($1.00)
EDRS Price - MF01 Plus Postage. PC Not Available from EDRS.
Language: ENGLISH
Journal Announcement: RIEMAR71
This booklist is intended for elementary school science students with high interest and low vocabulary skills. The Spache Readability Scale, Dale-Chall formula, sentence structure, paragraph flow, illustration, and diagram analysis or publishers stated grade level were used to determine grade level designations. The included interest level varies from about kindergarten through grade nine and reading level from grades one through four on general science topics including animals, amphibians, astronomy, birds, conservation, earth studies, electricity, fish, health, insects, machines, magnets, ocean life, plants, reptiles, seasons, spiders, space travel, trees, and worms. A list of publishers with addresses is included. (JM)
Descriptors: *Bibliographies; *Elementary School Science; General Science; *Instructional Materials; Readability; *Reading Difficulties; Reading Interests; *Remedial Reading

ED044270# SE008972
**Aerospace-Oriented Units for Use in Secondary School Classes.**
Williams, Mary H.; And Others
Lincoln Public Schools, Nebr.
Sep 1968 291p.
Sponsoring Agency: Bureau of Elementary and Secondary Education (DHEW/OE), Washington, D.C.
Available from: Available on loan from the ERIC Information Analysis Center for Science and Mathematics Education, 1460 West Lane Ave., Columbus, Ohio 43221
Document Not Available from EDRS.
Language: ENGLISH
Journal Announcement: RIEMAR71
This set of nine units is intended to furnish aerospace-oriented resource material to help teachers include recent scientific and technological advances in the secondary school science curriculum. The units provided are as follows: history of astronomy, the solar system, beyond the solar system, history of flight, spaceflight facts, aerology, navigation and communication unmanned space exploration, and manned space flight. Each unit is subdivided into parts and includes the following suggestions: objectives, basic and supplementary reading assignments, suggested films, filmstrips and other teaching aids, background information, activities and projects, and a guide for evaluating learning in terms of the stated objectives. Basic reading assignments are made to a specific set of reference books. Supplementary references are collected into a classified bibliography of resource materials, which also includes films, filmstrips, transparencies, Ditto masters, and miscellaneous teaching aids. This work was prepared under an ESEA Title III contract. Copy not available due to marginal legibility of original document. (AL)
Descriptors: Aerospace Technology; *Instruction; Lesson Plans; *Objectives; *Physical Sciences; *Secondary School Science; *Teaching Guides
Identifiers: Elementary Secondary Education Act Title III

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DIALOG File 1: ERIC - 66-85/JUN

ED043496 SE009046
**Earth-Space Science Activity Syllabus for Elementary and Junior High School Teachers of Science.**
Maier, Jack; And Others
Lake County Board of Public Instruction, Tavares, Fla.
Sep 1968 210p.
Sponsoring Agency: Bureau of Elementary and Secondary Education (DHEW/OE), Washington, D.C.
EDRS Price - MF01/PC09 Plus Postage.
Language: ENGLISH
Journal Announcement: RIEFEB71
This syllabus is a collection of earth-space science laboratory activities and demonstrations intended for use at the elementary and junior high school levels. The activities are grouped into eight subject sections: Astronomy, Light, Magnetism, Electricity, Geology, Weather, Sound, and Space. Each section begins with brief background information, including an introduction, vocabulary list, and basic concepts. The activities are presented with objectives, materials, procedures, and, when appropriate, conclusions and suggestions for further activities. Clarifying diagrams of the equipment and material arrangements accompany most activities. This work was prepared under an ESEA Title III contract. (PR)
Descriptors: Aerospace Technology; Earth Science; *Elementary School Science; *Instructional Materials; *Physical Sciences; Resource Materials; *Science Activities; *Secondary School Science
Identifiers: Elementary Secondary Education Act Title III

ED043478 SE007671
**Short Films for Physics Teaching, A Catalog.**
Bluestone, Barbara Z.; Roth, Richard F.
Commission on Coll. Physics, College Park, Md.
[1969 82p.
Sponsoring Agency: National Science Foundation, Washington, D.C.
EDRS Price - MF01/PC04 Plus Postage.
Language: ENGLISH
Journal Announcement: RIEFEB71
This annotated film catalog is a product of the Conference on Single Concept Films in College Physics Teaching sponsored by the Commission on College Physics. Both 8mm and 16mm single concept films are listed for physics and related disciplines. The catalog includes commercial, noncommercial, and foreign films. However, the film coverage was limited to those lasting 10 minutes or less, with the exception of film cartridges for the Fairchild projector. The films are grouped into eleven areas: Mechanics; Thermodynamics; Electricity and Magnetism; Optics and Waves; Atomic and Nuclear; Fluid Mechanics; Astronomy; Chemistry; Mathematics; Lab, Apparatus, and Miscellaneous. The appendices include a list of film distributors and producers, a list of computer-animated films, and a list of leading university audio-visual libraries. (PR)
Descriptors: Catalogs; *Chemistry; Films; *Instructional Materials; *Mathematics; *Physical Sciences; *Physics; Single Concept Films

ED043414 88 RC004678
**Look unto the Hills. Title III ESEA, West Virginia, Vol. II.**
West Virginia State Dept. of Education, Charleston.
Jun 1970 23p.
Sponsoring Agency: Division of Plans and Supplementary Centers, BESE.
Report No.: DPSC-66-1928
EDRS Price - MF01/PC01 Plus Postage.
Language: ENGLISH
Journal Announcement: RIEFEB71
A 2- or 3-paragraph description of each of the 15 operational projects, 6 planning grants, and 1 minigrant is found in this document on West Virginia's past and present projects (through June 30, 1970) funded under Title III of the Elementary and Secondary Education Act. Each description includes information such as the target student population, the project region, and goals and major objectives of the project. For the most part, Title III efforts are innovative educational programs serving multicounty areas through the 7 PACE centers which have been established. (LS)
Descriptors: Astronomy; Audiovisual Centers; Counseling Services; Curriculum Development; Curriculum Evaluation; *Educational Improvement; Educational Innovation; *Enrichment Activities; *Federal Programs; Fine Arts; Inservice Education Instructional Materials; Music Education; *Program Descriptions; Reading Centers; Resource Centers; *Rural Areas Sciences
Identifiers: *PACE; West Virginia

ED042601 SE008059
**The Construction (Using Multi-Media Techniques) of Certain Modules of a Programmed Course in Astronomy-Space Sciences for NASA Personnel of The Goddard Space Flight Center, Greenbelt, Maryland.**
Collagan, Robert B.
Morgan State Coll., Baltimore, Md.
Feb 1970 8p.; Paper presented at the Annual Meeting of the National Association for Research in Science Teaching (43rd, Minneapolis, Minn., March 5-8, 1970)
EDRS Price - MF01/PC01 Plus Postage.
Language: ENGLISH
Journal Announcement: RIEJAN71
This paper describes the development of a self-instructional multi-media course in astronomy-space sciences for non-technical NASA personnel. The course consists of a variety of programed materials including slides, films, film-loops, filmstrips video-tapes and audio-tapes, on concepts of time, space, and matter in our solar system and galaxy. General objectives of the program, and the evaluation of the achievement of these objectives are discussed. Proposals for the development of three additional autoinstructional modules are presented. In addition, the author states his intention of using control and experimental groups to evaluate the success or failure of the program. (LC)
(cont. next page)

DIALOG File 1: ERIC - 66-85/JUN

Descriptors: Adult Education; *Aerospace Technology; Astronomy; *Autoinstructional Aids; *Curriculum; Instructional Materials; *Multimedia Instruction; Program Descriptions; *Programed Instruction; *Units of Study

ED041770 SE009326
**Science for Georgia Schools, Junior High Earth Science, Volume 3-B, Preliminary Edition.**
Georgia State Dept. of Education, Atlanta. Div. of Curriculum Development.
1970 105p.
EDRS Price - MF01/PC05 Plus Postage.
Language: ENGLISH
Journal Announcement: RIEDEC70
This is a curriculum guide for the preliminary edition of Volume III-B of Science For Georgia Schools, Junior High Earth Science. The course of study is designed for the eighth grade and includes selected topics from astronomy, meteorology, geology, oceanography, physical geography, and space travel. Topics are grouped under five units called (1) lithosphere, (2) hydrosphere, (3) atmosphere, (4) astronomy, and (5) space. In this teacher's guide, outlines for teaching the topics are presented. Each outline contains a list of (1) concepts to be learned, (2) activities, experiments, and demonstrations to illustrate the concepts, (3) films, and (4) references. The guide also lists supplementary activities, the sources of earth science materials, bibliographies of student and teacher references, and equipment. (LC)
Descriptors: *Curriculum; *Earth Science; Grade 8; *Instructional Materials; Resource Materials; Science Activities; Scientific Concepts; *Secondary School Science; *Teaching Guides
Identifiers: Georgia

ED040047 SE008196
**Space Resources for Teachers, Space Science, A Guide Outlining Understandings, Fundamental Concepts, and Activities.**
Thompson, Malcolm
Columbia Univ., New York, N.Y.; National Aeronautics and Space Administration, New York, N. Y. Goddard Inst. for Space Studies.
1969 145p.
Available from: Superintendent of Documents, U.S. Government Printing Office, Washington, D.C. 20402 (0-358-779, $2.00)
EDRS Price - MF01 Plus Postage. PC Not Available from EDRS.
Language: ENGLISH
Journal Announcement: RIEOCT70
This instructional and resource guide is designed so that it may be used in the secondary school or in the first two years of college to present a series of units in space science, or to supplement existing science and mathematics courses. The guide consists of six units: (1) measurement, distance, and size in astronomy, (2) atoms, spectra, and stars, (3) atomic nuclei and stars, (4) the solar system, (5) the origin and evaluation of life, and (6) motion, rockets and gravity. Each unit is divided into the following parts: (a) a list of understandings that a student should have after completing study of the unit, (b) a topical outline of the material in the unit, with expositions, tables, demonstrations, and activities inserted when appropriate, (c) a list of sample questions, (d) problems and projects for further exploration, (e) audiovisual aids, (f) an annotated teacher bibliography and (g) an annotated student bibliography. Each of the units is basically self-contained. However, in general they require additional knowledge which may be obtained by a study of the earlier units, from the context of another course, or by a study of the material listed in the bibliographies. The material in the guide covers a range of difficulty levels, from grade nine through the first two years of college. (LC)
Descriptors: *Aerospace Technology; Annotated Bibliographies; *Astronomy; *College Science; *Instructional Materials; Physical Sciences; Science Activities; *Secondary School Science; Teaching Guides

ED036241 FL001644
**Dante, Seventh Centennial, 1265-1965: Resource Materials for Teachers. Curriculum Bulletin, 1965-66 Series, Number 16.**
Cavicchia, Gida; Costadasi, Virginia
New York City Board of Education, Brooklyn, N.Y.
Sep 1965 111p.
Available from: Board of Education of the City of New York, Publications Sales Office, 110 Livingston Street, Brooklyn, New York 11201 ($1.50)
EDRS Price - MF01 Plus Postage. PC Not Available from EDRS.
Language: ENGLISH
Journal Announcement: RIEJUN70
A two-part curriculum bulletin pays tribute to the life and works of Dante Alighieri during the 700th anniversary of his birth. Part One includes his biography, a discussion of his minor works, a summary of "The Divine Comedy", Dante's impact on other lands, and Dantean thought. Suggestions for teaching a resource unit for elementary and junior high school grades are provided. Other language arts topics are: (1) a guided reading lesson, (2) a composition lesson for vocabulary enrichment, (3) choral speaking, (4) poetry appreciation, and (5) literature. Materials related to Dante in social studies, mathematics, astronomy, music, the dance, art, and guidance are offered along with a bibliography. An original play, "Dante and Beatrice", is found in the appendix. (RL)
Descriptors: Authors; Biographies; Choral Speaking; *Curriculum Guides; Educational Media; Fine Arts; Instructional Program Divisions; *Interdisciplinary Approach; *Italian; Literary Criticism; Literary Styles; Literature; Mathematics; *Poets; Reading Comprehension; Reading Material Selection; Social Studies; Teaching Guides; Vocabulary Development; Writing Skills
Identifiers: *Dante (Alighieri); *Divine Comedy

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DIALOG File 1: ERIC - 66-85/JUN

ED033855 SE007606
**Concepts in Physical Science.**
Puri, O. P.
Cooperative General Science Project, Atlanta, Ga.
Aug 1969 194p.
EDRS Price - MF01/PC08 Plus Postage.
Language: ENGLISH
Journal Announcement: RIEMAR70
Contained in this experimental test are instructional materials for a one-semester course designed to give liberal arts students an appreciation of (1) the nature of science, (2) the development of science, (3) the contributions of scientists, (4) the impact of scientific discoveries on mankind, and (5) the possible future effects of science. The historical and philosophical approach is used to develop basic scientific concepts. Mathematical details and analyses are minimized. The test is divided into the following independent sections: (1) concepts of motion, (2) concepts of matter, (3) concepts of energy, (4) atoms in motion, (5) sound, (6) light, (7) electricity and magnetism, (8) the earth in time and space, and (9) the new physics. Photographs and illustrations accompany the descriptions of various scientific principles in each section Suggested outside readings and study questions are included at the end of each section. (LC)
Descriptors: Astronomy; *College Science; Earth Science; Electricity; Energy; Experimental Curriculum; *Instructional Materials; *Liberal Arts; *Majors (Students); Matter; Nuclear Physics; *Physical Sciences; *Scientific Concepts
Identifiers: Clark College GA; Cooperative General Science Program; Georgia; Georgia (Atlanta)

ED033037 SE007475
**Space Science K-6; Elementary Science Unit No. 1.**
Bethlehem Area Schools, Pa.
1966 172p.
EDRS Price - MF01 Plus Postage. PC Not Available from EDRS.
Language: ENGLISH
Journal Announcement: RIEFEB70
This curriculum guide, part of a series of science units, provides for differentiation of emphasis of subject areas at different grade levels. It is intended that the unit will be studied in depth by grades 1, 4, and 6. Kindergarten, grades 2 and 3 will study the unit in less detail. "Our Wonderful Sun" is studied in Kindergarten, "Earth in Space" in grade 1, "Men and Machines in Space" in grade 2, "Movements of the Earth and Moon" in grade 3, "Our Great Universe" in grade 4, and "From Atmosphere to Space" in grade 6. The unit for each grade contains (1) understandings to be discovered, (2) activities, and (3) activities to assign for homework or individual research. Each activity is introduced by a "leading question," followed by a list of materials and a description of the procedure to be followed. Children are taught to observe, infer, discuss problems and use reference and autiovisual aid materials. There is an index of science textbooks for reference for the teacher. The appendix contains (1) instructions for the construction and use of a star projector, (2) a guide for locating stars and constellations, (3) planetary data, and (4) dates of solar, annular and lunar eclipses. Not available in hard copy due to marginal legibility of original document . (LC)
Descriptors: *Aerospace Technology; Astronomy; Concept Formation; *Curriculum Guides; *Discovery Learning; Educational Objectives; *Elementary School Science; Instructional Materials; Problem Solving; *Science Activities Science Equipment; Teaching Methods

ED032236 SE007539
**Activities in Science Related to Space.**
National Aeronautics and Space Administration, Washington, D.C. Educational Programs Div.
1968 56p.
EDRS Price - MF01/PC03 Plus Postage.
Language: ENGLISH
Journal Announcement: RIEJAN70
Contained are a collection of science activities based upon forty-six scientific concepts related to space science. These activities are designed for junior high school science, but a much wider grade level range of use is possible. The booklet is primarily intended for teacher use. Each series of concept-oriented activities is independent of the others. The format consists of concept introduction, teacher information, and student activities. Application of the scientific concepts to aerospace technology are emphasized. (RR)
Descriptors: *Aerospace Technology; Astronomy; Elementary School Science; *Instructional Materials; Physical Sciences; *Science Activities; *Scientific Concepts; Secondary School Science
Identifiers: National Aeronautics and Space Administration

ED032235 SE007538
**Experiences in Space Science.**
National Aeronautics and Space Administration, Washington, D.C. Educational Programs Div.
1967 94p.
EDRS Price - MF01/PC04 Plus Postage.
Language: ENGLISH
Journal Announcement: RIEJAN70
This publication contains descriptions of space science activities that can be conducted with simple equipment. There are activities suitable for both elementary and secondary school children. Activities are placed under the headings: Astronomy, Atmosphere, Universal Gravitation, Aerodynamics, Guidance and Propulsion, Tracking and Communications, Thermal Conditions, Radiation, Analysis of Extraterrestrial Materials, Extraterrestrial Life, Man's Vital Functions in Space, Life Support Systems, and Physiological and Psychological Aspects of Space Flight. Historical and background information as well as illustrative diagrams accompany the suggested activities. (BR)

(cont. next page)

DIALOG File 1: ERIC - 66-85/JUN

Descriptors: *Aerospace Technology; Elementary School Science; *Instructional Materials; *Resource Materials; *Science Activities; Secondary School Science
Identifiers: Government Printing Office; National Aeronautics and Space Administration

ED032221 SE007479
**An Evaluative Study of the Effectiveness and Effects of Astronomy Materials Prepared by the University of Illinois Elementary-School Science Project.**
Klopfer, Leopold E.
Chicago Univ., Ill. Graduate School of Education.
[1964 59p.
EDRS Price - MF01/PC03 Plus Postage.
Language: ENGLISH
Journal Announcement: RIEJAN70
Evaluated was the effectiveness of the materials of one book, "Charting the Universe," of the six books that comprise the University of Illinois Elementary Science Project. Five hypotheses were tested, including one related to students' general understanding of science, and another related to students' views of astronomy, arithmetic, scientists, and learning experiences in science. Instruments used were Test on Understanding Science (TOUS), two locally constructed subject-matter achievement tests, and an experimental designed semantic differential instrument to measure children's perceptions of science. The student population (43 boys and 49 girls) consisted of the entire fifth grade in the University of Chicago Laboratory School during the school year 1963-64. All students were taught for ten weeks by the same person, a science teacher at the Laboratory School. Major findings of the study were: (1) students were moderately successful in mastering some of the topics taught; (2) students' general knowledge of astronomy increased during the ten weeks of instruction; (3) the effect of studying these materials on general understanding of science were slight; (4) studying the materials did affect the students' view of astronomy, but did not affect their view of learning experiences in science. (BR)
Descriptors: *Astronomy; Earth Science; *Elementary School Science; *Evaluation; Instructional Materials; *Science Course Improvement Projects
Identifiers: National Science Foundation; Test on Understanding Science

ED027677# EC003644
**Science for Deaf Children. The Lexington School for the Deaf Education Series, Book V.**
Leitman, Allan
Lexington School for the Deaf, New York, N.Y. Curriculum Committee.
1968 138p.
Available from: The Alexander Graham Bell Association for the Deaf, Inc., The Volta Bureau, 1537 35th Street, N.W., Washington, D.C. 20007 ($4.25).
Document Not Available from EDRS.
Language: ENGLISH
Journal Announcement: RIEAUG69
Intended for use by teachers and schools for the deaf, the booklet presents activities and units which may be used in planning and developing a science curriculum. A workshop classroom is described. Attention is given to teaching methods specifically applicable to the deaf. Suggested subject areas, materials, or activities for preschool programs are large muscle movement, the senses, and integrated use of the senses; for primary programs, plants, ice cubes, light and shadows, structures, balance boards and simple machines, the play frame, air and water, simple electrical circuits, and trips; and for intermediate programs, bones, animal husbandry, tadpoles, microecology, time, growing molds, community constructions, mealworms, and rocks (crystal growing and three dimensional models). Physical sciences delineated for the advanced program include astronomy, thermometry, geology, and a school weather station; biological sciences include the study of the microscopic world, incubation of chicken eggs, and anatomy, physiology, and zoology; and extracurricular clubs and ideas are a joint study club, classes in schools for students who hear, and sciences. Appendixes contain plans for equipment and illustrations of completed science projects. (SN)
Descriptors: Activities; Biology; *Curriculum; Deafness; *Exceptional Child Education; *Hearing Impairments; Independent Study; Instructional Materials; Intermediate Grades; Physical Sciences; Preschool Curriculum; Primary Education; Science Experiments; Science Projects; *Sciences; Scientific Concepts; Secondary Education; *Teaching Methods

ED027223 SE006317
**America in Space, the First Decade - Space Physics and Astronomy, Man in Space, Exploring the Moon and Planets, Putting Satellites to Work, NASA Spacecraft, Spacecraft Tracking, Linking Man and Spacecraft.**
Corliss, William R.; Anderton, David A.
National Aeronautics and Space Administration, Washington, D.C.
Oct 1968 206p.
EDRS Price - MF01/PC09 Plus Postage.
Language: ENGLISH
Journal Announcement: RIEJUL69
Included are seven booklets, part of a series published on the occasion of the tenth anniversary of the National Aeronautics and Space Administration (NASA). The publications are intended as overviews of some important activities, programs, and events of NASA. They are written for the layman and cover several science disciplines. Each booklet contains numerous photographs and diagrams. The booklets included are "Space Physics and Astronomy," "Exploring the Moon and Planets," "Putting Satellites to Work," "NASA Spacecraft," "Space Craft Tracking," "Man in Space," " Linking Man and Space Craft," "America In Space, The First Decade." (BC)
(cont. next page)

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**DIALOG File 1: ERIC - 66-85/JUN**

Descriptors: *Adult Education; *Aerospace Technology; Astronomy; *Instructional Materials; Physics; *Secondary School Science
Identifiers: National Aeronautics and Space Administration

ED027211 SE006281
**Space Science Educational Media Resources, A Guide for Junior High School Teachers.**
McIntyre, Kenneth M.
National Aeronautics and Space Administration, Washington, D.C.
Jun 1966 108p.
Available from: National Aeronautics and Space Administration, Washington, D.C. ($3.50)
EDRS Price - MF01 Plus Postage. PC Not Available from EDRS.
Language: ENGLISH
Journal Announcement: RIEJUL69
This guide, developed by a panel of teacher consultants, is a correlation of educational media resources with the "North Carolina Curricular Bulletin for Eighth Grade Earth and Space Science" and the state adopted textbook, pModern Earth Science." The three major divisions are (1) the Earth in Space (Astronomy), (2) Space Exploration, and (3) Meterology. Included for the primary topics under each division are (1) statements of concepts, (2) student activities, and (3) annotated listings of films, filmstrips, film-loops, transparencies, slides, and other forms of instructional media. Appendixes are (1) a directory to sources of instructional media, (2) a title index to the films and filmstrips cited, (3) a listing of bibliographies, guides, and printed materials related to aerospace education. (RS)
Descriptors: *Aerospace Technology; Earth Science; *Educational Media; Films; Filmstrips; Grade 8; *Resource Materials; *Science Activities; *Secondary School Science; Teaching Guides; Transparencies
Identifiers: National Aeronautics and Space Administration

ED026274 SE006269
**The Planetarium, An Elementary-School Teaching Resource.**
Wagner, Bartlett A., Ed.
Bridgeport Univ., Conn.
Feb 1966 60p.
Sponsoring Agency: National Aeronautics and Space Administration, Washington, D.C.
Report No.: EP-42
EDRS Price - MF01/PC03 Plus Postage.
Language: ENGLISH
Journal Announcement: RIEJUN69
This booklet was developed to provide helpful suggestions for planetarium directors, teachers, and school supervisors. The booklet is divided into seven different units of study. Each unit is similar in design and format, beginning with an overview of the topic followed by a description of planetarium activities which the authors successfully employed in their classes during the 1963-64 school year. Each unit also includes related vocabulary, suggested questions and activities for pupils, mention of pioneers in science, and lists of selected books and audiovisual aids. A brief description of the Bridgeport Planetarium is included in order to give the potential user a better appreciation of possibilities in his own locale. Teachers who do not have ready access to planetariums may also find this booklet useful for its suggestions relative to resources and activities. (BC)
Descriptors: Astronomy; Audiovisual Aids; Bibliographies; *Earth Science; *Elementary School Science; Films; Instructional Materials; *Planetariums; Science Activities; *Teaching Guides

ED026272 SE006267
**Aerospace Bibliography, Fourth Edition.**
National Aerospace Education Council, Washington, D.C.
Jan 1968 62p.
Sponsoring Agency: National Aeronautics and Space Administration, Washington, D.C.
Report No.: EP-48
Available from: Superintendent of Documents, Government Printing Office, Washington, D.C. 20402 ($.40)
EDRS Price - MF01/PC03 Plus Postage.
Language: ENGLISH
Journal Announcement: RIEJUN69
This annotated bibliography, intended for elementary and secondary school teachers, their pupils, and general adult readers contains grade level coded lists of books, reference works, periodicals, and teaching aids dealing with astronomy and space flight subjects. The reading material is listed alphabetically by author. The teaching aids in Part IV are categorized under subject headings and subheadings. Headings include manned space flight, unmanned spacecraft, rockets, model rocketry, astronomy, and careers. Addresses of publishers and suppliers are included. (BC)
Descriptors: *Aerospace Technology; Annotated Bibliographies ; Astronomy; *Bibliographies; Earth Science; *Elementary School Science; Instructional Materials; *Secondary School Science
Identifiers: National Aeronautics and Space Administration

ED024179 40 EC002671
**In-Service Training Materials for Teachers of the Educable Mentally Retarded.**
Meyen, Edward L.; Carr, Donald L.
Iowa Univ., Iowa City. Special Education Curriculum Development Center.
[1966 220p.
Sponsoring Agency: Office of Education (DHEW), Washington, D.C.
Bureau No.:BR-6-2883-5
Grant No.: OEG-3-7-002883-0499
EDRS Price - MF01/PC09 Plus Postage.
(cont. next page)

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DIALOG INFORMATION SERVICES, INC.

**DIALOG File 1: ERIC - 66-85/JUN**

Language: ENGLISH
Journal Announcement: RIEAPR69
Developed for the educable mentally retarded, this spiral program of science instruction presents its subjects on several levels for advanced study and reinforcement. Subjects covered are animals, plants, weather and seasons, earth and earth components, the universe, forces, and the human being. Guides for the primary, intermediate, junior high, and senior high levels include general objectives, activities, and sample experiences. A complete starter unit is included for the first three levels on pets, the senses, and the weather. Suggested resource materials are listed for all levels; forms are included for teacher evaluation of the material. (LE)
Descriptors: Animals; Astronomy; Biological Sciences; *Curriculum; Curriculum Guides; Earth Science; *Exceptional Child Education; High Schools; Intermediate Grades; Junior High Schools; Lesson Plans; *Mental Retardation; Mild Mental Retardation; Physical Sciences; Plant Science; Primary Education; *Sciences; Spiral Curriculum

ED023610 SE005588
**Guide for Teaching Science Problems 1-2, Grade XI or XII. Second Edition.**
Fredrickson, Clifford T.
San Diego City Schools, Calif.
1966 267p.
EDRS Price - MF01/PC11 Plus Postage.
Language: ENGLISH
Journal Announcement: RIEMAR69
Science Problems 1-2 is a terminal course for eleventh and twelfth grade students with limited science background and generally below average reading levels. The guide is intended as a supplement to the detailed teacher's guide prepared by the publishers of the textbook used in the course. It is assumed that no teacher is expert in all subject matter areas covered in the course. Therefore, each unit in the guide contains detailed sections on learning objectives, text and supplementary references for specific topics, resource materials, audio-visual materials, in-school materials, classroom activities, and an evaluation sheet for feedback from the teacher. A lengthy appendix contains maps, charts, worksheets, and laboratory exercises. Topics in the course include the nature of science, matter and energy, the atmosphere, the hydrosphere, the lithosphere, plants and animals, the human body, energy and machines, and astronomy. (BC)
Descriptors: Course Descriptions; *Curriculum; Evaluation; *General Science; Grade 11; Grade 12; Instruction; Instructional Materials; *Low Ability Students; Objectives; Science Activities; Science Equipment; *Secondary School Science; *Teaching Guides
Identifiers: California; San Diego Unified School District CA

ED023608 SE005584
**A Guide for Teaching General Science 1-2 (8th).**
Gay, Philip D.
San Diego City Schools, Calif.
1967 261p.
EDRS Price - MF01/PC11 Plus Postage.
Language: ENGLISH
Journal Announcement: RIEMAR69
This guide was prepared as an aid to teachers of general science 1-2, grade 8. One of the major purposes of the guide is to assist the teachers in adopting a discovery-oriented approach in the classroom. The course is designed to prepare able students for the advanced science courses, grades 9-12. Teaching techniques, homework, laboratory experiences, safety, evaluation, and individual research projects are discussed. Eleven study units are presented including perception, life, biochemistry, sound, astronomy, light, chemistry, nuclear energy, and geology. Appendices include suggested student problems and various charts and tables. (BC)
Descriptors: Course Descriptions; *Curriculum; *General Science; Grade 8; Instruction; Instructional Materials; Objectives; Science Equipment; *Secondary School Science; *Teaching Guides
Identifiers: California; San Diego Unified School District CA

ED021766 SE004994
**Science Education Information Report, General Bibliography Series 8, Legislative Acts and Reports, Administration and Supervision, Science Facilities.**
ERIC Information Analysis Center for Science Education, Columbus, Ohio.
May 1968 14p.
EDRS Price - MF01/PC01 Plus Postage.
Language: ENGLISH
Journal Announcement: RIEJAN69
This is the eighth in a series of general bibliographies which are being developed to disseminate information concerning documents analyzed at the ERIC Information Analysis Center for Science Education. Reported are over 30 citations to selected documents in the areas of (1) legislative acts and reports, (2) administration and supervision, and (3) science facilities. The documents include research reports, research reviews, conference reports, project reports, position papers, manuals, and speeches. The citations are categorized under the major areas in alphabetical order by author and indicate the availability and major ideas of the document. General bibliographies have been or are being prepared for other selected areas in science education. All bibliographies will be supplemented periodically as more documents are processed by the ERIC Information Analysis Center for Science Education. (DS)
Descriptors: *Administration; Astronomy; *Bibliographies; Biological Sciences; Chemistry; College Science; Conservation
(cont. next page)

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**DIALOG File 1: ERIC - 66-85/JUN**

Education; Curriculum; Doctoral Dissertations; Earth Science; Elementary School Science; Federal Aid; Federal Programs; General Science; Instructional Materials; *Legislation; Mathematics Education; Outdoor Education; *Science Facilities Secondary School Science; *Supervision

ED019242 SE003944
**REORGANIZED SCIENCE CURRICULUM, 1, GRADE ONE SUPPLEMENT.**
Minneapolis Special School District Number 1, Minn.
01OCT1962 134P.
EDRS Price - MF01/PC06 Plus Postage.
Language: ENGLISH
Journal Announcement: CUMREPT
THE SECOND IN A SERIES OF17 VOLUMES, THIS VOLUME PROVIDES THE FIRST GRADE TEACHER WITH A GUIDE TO THE REORGANIZED SCIENCE CURRICULUM OF THE MINNEAPOLIS PUBLIC SCHOOLS. THE MATERIALS ARE INTENDED TO BE AUGMENTED AND REVISED AS THE NEED ARISES. A CHART INDICATES CONCEPT TO BE TAUGHT IN GRADES K-3 FOR EACH OF THE FOUR AREAS AROUND WHICH THE PROGRAM IS DESIGNED. THE AREAS ARE (1) THE EARTH, (2) LIVING THINGS, (3) ENERGY, AND (4) THE UNIVERSE. AT PRESENT THE RESOURCE UNITS SECTION OF THE SUPPLEMENT CONTAINS A UNIT ON ENERGY. OTHERS WILL BE ADDED AS THEY BECOME AVAILABLE. COURSE CONTENT FOR K-12 IS GIVEN IN CHART FORM. IN ADDITION TO THE INTRODUCTORY MATERIAL, SECTIONS OF THE SUPPLEMENT ARE (1) CONCEPTS, (2) RESOURCE UNITS, (3) ANNOTATED BIBLIOGRAPHY, BOOKS, (4) ANNOTATED BIBLIOGRAPHY, FILMS, AND (5) EQUIPMENT AND SUPPLIES. (DH)
Descriptors: Astronomy; Bibliographies; Biology; *Curriculum ; *Curriculum Development; Earth Science; *Elementary School Science; *Grade 1; Instructional Materials; Physical Sciences Science Activities; Science Curriculum; Science Equipment; Science Materials; *Teaching Guides
Identifiers: MINNESOTA; Minnesota (Minneapolis)

ED019241 SE003944
**REORGANIZED SCIENCE CURRICULUM, 8, GRADE EIGHT SUPPLEMENT.**
Minneapolis Special School District Number 1, Minn.
21OCT1966 72P.
EDRS Price - MF01/PC03 Plus Postage.
Language: ENGLISH
Journal Announcement: CUMREPT
THE FOURTEENTH IN A SERIES OF 17 VOLUMES, THIS VOLUME PROVIDES THE EIGHTH GRADE TEACHER WITH A GUIDE TO THE REORGANIZED SCIENCE CURRICULUM OF THE MINNEAPOLIS PUBLIC SCHOOLS. THE MATERIALS ARE AUGMENTED AND REVISED AS THE NEED ARISES. A CHART INDICATES CONCEPT BRIEF SUMMARY OF SUBJECT MATTER CONTENT FOR GRADE 8, AND A CHART OF THE GRADE CONTENT FOR THE ENTIRE K-12 PROGRAM IN EACH OF THE FOLLOWING MAJOR AREAS AROUND WHICH THE PROGRAM IS DESIGNED--(1) THE EARTH, (2) LIVING THINGS, (3) ENERGY, AND (4) THE UNIVERSE. THIS VOLUME ALSO CONTAINS THESE SECTIONS--(1) CONCEPTS, (2) LEARNING EXPERIENCES, (3) BIBLIOGRAPHY, BOOKS, (4) BIBLIOGRAPHY, FILMS, (5) BIBLIOGRAPHY, FILMSTRIPS, AND (6) EQUIPMENT AND SUPPLIES. THE LEARNING EXPERIENCES SECTION IS CONCERNED WITH WEATHER INSTRUMENTS, MINERAL IDENTIFICATION, AND THE SOLAR SYSTEM. (DH)
Descriptors: Astronomy; *Bibliographies; *Curriculum; *Curriculum Development; *Earth Science; Geology; *Grade 8; Instructional Materials; Meteorology; Physical Sciences; Science Activities; Science Equipment; Science Materials; Secondary School Science; Teaching Guides
Identifiers: MINNESOTA; Minnesota (Minneapolis)

ED019237 SE003938
**REORGANIZED SCIENCE CURRICULUM, 6B, A RESOURCE UNIT TO BE TAUGHT IN GRADE SIX.**
Minneapolis Special School District Number 1, Minn.
242P.
EDRS Price - MF01/PC10 Plus Postage.
Language: ENGLISH
Journal Announcement: CUMREPT
THE TENTH IN A SERIES OF 17 VOLUMES, THIS VOLUME PROVIDES THE SIXTH GRADE TEACHER WITH A GUIDE TO THE REORGANIZED SCIENCE CURRICULUM OF THE MINNEAPOLIS PUBLIC SCHOOLS. THE MATERIALS ARE INTENDED TO BE AUGMENTED AND REVISED AS THE NEED ARISES. THIS VOLUME, 6B, IS ONE OF THE THREE COMPRISING THE SIXTH GRADE SUPPLEMENT, AND CONTAINS A RESOURCE UNIT ON SPACE TRAVEL. VOLUME 6C CONTAINS RELATED SECTIONS FOR SIXTH GRADE MATERIALS ENTITLED (1) BIBLIOGRAPHY, BOOKS, (2) BIBLIOGRAPHY, FILMS, AND (3) EQUIPMENT AND SUPPLIES. (DH)
Descriptors: *Astronomy; *Curriculum; *Curriculum Development; Earth Science; *Grade 6; Instructional Materials Physical Sciences; Science Activities; Science Curriculum; *Teaching Guides
Identifiers: MINNESOTA; Minnesota (Minneapolis)

ED019236 SE003937
**REORGANIZED SCIENCE CURRICULUM, K, KINDERGARTEN SUPPLEMENT.**
Minneapolis Special School District Number 1, Minn.
01OCT1962 140P.
EDRS Price - MF01/PC06 Plus Postage.
Language: ENGLISH
Journal Announcement: CUMREPT
THIS VOLUME PROVIDES THE KINDERGARTEN TEACHER WITH A GUIDE TO THE REORGANIZED SCIENCE CURRICULUM OF THE MINNEAPOLIS PUBLIC SCHOOLS. THE MATERIALS ARE INTENDED TO BE AUGMENTED AND REVISED AS THE NEED ARISES. A CHART INDICATES CONCEPTS TO BE TAUGHT IN GRADES K-3 FOR EACH OF THE FOUR AREAS AROUND WHICH THE PROGRAM IS DESIGNED. THE AREAS ARE (1) THE EARTH, (2) LIVING THINGS, (3) ENERGY, AND (4) THE UNIVERSE. AT THE PRESENT TIME THE SUPPLEMENT CONTAINS MATERIAL FOR THE EARTH AND THE UNIVERSE. OTHER AREAS WILL BE ADDED AS THEY BECOME AVAILABLE. COURSE CONTENT FOR THE VARIOUS GRADES OF THE ENTIRE K-12 PROGRAM ARE ALSO GIVEN IN CHART FORM. IN ADDITION TO THE INTRODUCTORY MATERIAL, SECTIONS OF THE SUPPLEMENT ARE (1) CONCEPTS, (2) RESOURCE UNITS, (3) ANNOTATED BIBLIOGRAPHY, BOOKS, (4) ANNOTATED BIBLIOGRAPHY, FILMS, AND (5) EQUIPMENT

(cont. next page)

DIALOG File 1: ERIC - 66-85/JUN

AND SUPPLIES. (DH)
Descriptors: Astronomy; Bibliographies; Biology; Curriculum *Curriculum Development; Earth Science; *Elementary School Science; Instructional Materials; *Kindergarten; Physical Sciences; Science Activities; Science Curriculum; Science Equipment; Science Materials; *Teaching Guides
Identifiers: MINNESOTA; Minnesota (Minneapolis)

ED019234 SE003935
**REORGANIZED SCIENCE CURRICULUM, 2, GRADE TWO SUPPLEMENT.**
Minneapolis Special School District Number 1, Minn.
01OCT1962 189P.
EDRS Price - MF01/PC08 Plus Postage.
Language: ENGLISH
Journal Announcement: CUMREPT
THE THIRD IN A SERIES OF 17 VOLUMES, THIS VOLUME PROVIDES THE SECOND GRADE TEACHER WITH A GUIDE TO THE REORGANIZED SCIENCE CURRICULUM OF THE MINNEAPOLIS PUBLIC SCHOOLS. THE MATERIALS ARE INTENDED TO BE AUGMENTED AND REVISED AS THE NEED ARISES. A CHART INDICATES CONCEPTS TO BE TAUGHT IN GRADES K-3, IN EACH OF THE FOUR AREAS AROUND WHICH THE PROGRAM IS ORGANIZED. THE AREAS ARE (1) THE EARTH, (2) LIVING THINGS, (3) ENERGY, AND (4) THE UNIVERSE. AT PRESENT THE RESOURCE UNITS SECTION OF THE SUPPLEMENT INCLUDES A UNIT ON ENERGY. OTHERS WILL BE ADDED AS THEY BECOME AVAILABLE. COURSE CONTENT FOR K-12 IS GIVEN IN CHART FORM. IN ADDITION TO THE INTRODUCTORY MATERIAL, SECTIONS OF THE SUPPLEMENT ARE (1) CONCEPTS, (2) RESOURCE UNITS, (3) ANNOTATED BIBLIOGRAPHY, BOOKS, (4) ANNOTATED BIBLIOGRAPHY, FILMS, AND (5) EQUIPMENT AND SUPPLIES. (DH)
Descriptors: Astronomy; Bibliographies; Biology; Curriculum *Curriculum Development; Earth Science; *Elementary School Science; *Grade 2; Instructional Materials; Physical Sciences Science Activities; Science Curriculum; Science Equipment; Science Materials; *Teaching Guides
Identifiers: MINNESOTA; Minnesota (Minneapolis)

ED019233 SE003934
**REORGANIZED SCIENCE CURRICULUM, 5A, FIFTH GRADE SUPPLEMENT.**
Minneapolis Special School District Number 1, Minn.
01DEC1964 126P.
EDRS Price - MF01/PC06 Plus Postage.
Language: ENGLISH
Journal Announcement: CUMREPT
THE SEVENTH IN A SERIES OF 17 VOLUMES, THIS VOLUME PROVIDES THE FIFTH GRADE TEACHER WITH A GUIDE TO THE REORGANIZED SCIENCE CURRICULUM OF THE MINNEAPOLIS PUBLIC SCHOOLS. THE MATERIALS ARE INTENDED TO BE AUGMENTED AND REVISED AS THE NEED ARISES. THERE IS A DETAILED OUTLINE OF SUBJECT MATTER FOR GRADE 5 FOR EACH OF THE FOLLOWING MAJOR AREAS AROUND WHICH THE PROGRAM IS DESIGNED--(1) THE EARTH, (2) LIVING THINGS, (3) ENERGY, AND (4) THE UNIVERSE. A CHART INDICATES GRADE CONTENT FOR THE ENTIRE K-12 PROGRAM. THE FIFTH GRADE SUPPLEMENT IS IN TWO VOLUMES, 5A CONTAINING THE SECTIONS ON (1) CONCEPTS, AND (2) RESOURCE UNITS, AND VOLUME 5B CONTAINING THE BIBLIOGRAPHIES AND EQUIPMENT AND SUPPLIES SECTIONS. THE RESOURCE UNITS INCLUDE DESCRIPTIONS OF UNITS DEALING WITH (1) HEAT AND INFRARED RADIATION, AND (2) THE UNIVERSE. THE LATTER IS DIVIDED INTO THE FOLLOWING SUBSECTIONS--(1) EARTH, (2) MOON, (3) SUN, (4) SOLAR SYSTEM, AND (5) STARS AND GALAXIES. (DH)
Descriptors: Astronomy; Biology; *Curriculum; *Curriculum Development; Earth Science; *Elementary School Science; *Grade 5; Instructional Materials; Physical Sciences; Science Activities; Science Curriculum; *Teaching Guides
Identifiers: MINNESOTA; Minnesota (Minneapolis)

ED019232 SE003933
**REORGANIZED SCIENCE CURRICULUM, 4A, FOURTH GRADE SUPPLEMENT.**
Minneapolis Special School District Number 1, Minn.
01MAR1965 190P.
EDRS Price - MF01/PC08 Plus Postage.
Language: ENGLISH
Journal Announcement: CUMREPT
THE FIFTH IN A SERIES OF 17 VOLUMES, THIS VOLUME PROVIDES THE FOURTH GRADE TEACHER WITH A GUIDE TO THE REORGANIZED SCIENCE CURRICULUM OF THE MINNEAPOLIS PUBLIC SCHOOLS. THE MATERIALS ARE INTENDED TO BE AUGMENTED AND REVISED AS THE NEED ARISES. THERE IS A DETAILED OUTLINE OF THE CONTENT FOR GRADE 4 FOR EACH OF THE FOLLOWING MAJOR AREAS AROUND WHICH THE CURRICULUM IS DESIGNED--(1) THE EARTH, (2) LIVING THINGS, (3) ENERGY, AND (4) THE UNIVERSE. A CHART INDICATES CONTENT FOR THE ENTIRE K-12 PROGRAM. THE FOURTH GRADE SUPPLEMENT IS IN TWO VOLUMES, 4A CONTAINS SECTIONS ON (1) CONCEPTS, AND (2) RESOURCE UNITS, AND 4B CONTAINS BIBLIOGRAPHIES AND EQUIPMENT AND SUPPLIES SECTIONS. RESOURCE UNITS ARE (1) AIR, (2) LIVING THINGS--ECOLOGY, AND (3) ROCKS. (DH)
Descriptors: Astronomy; Biology; *Curriculum; *Curriculum Development; Earth Science; *Ecology; *Elementary School Science; *Grade 4; Instructional Materials; Physical Sciences Science Activities; Science Curriculum; Teaching Guides
Identifiers: MINNESOTA; Minnesota (Minneapolis)

ED019231 SE003932
**REORGANIZED SCIENCE CURRICULUM, 3, GRADE THREE SUPPLEMENT.**
Minneapolis Special School District Number 1, Minn.
01OCT1962 175P.
EDRS Price - MF01/PC07 Plus Postage.
Language: ENGLISH
Journal Announcement: CUMREPT
THE FOURTH IN A SERIES OF 17 VOLUMES, THIS VOLUME PROVIDES THE THIRD GRADE TEACHER WITH A GUIDE TO THE REORGANIZED SCIENCE CURRICULUM OF THE MINNEAPOLIS PUBLIC SCHOOLS. THE MATERIALS ARE INTENDED TO BE AUGMENTED AND REVISED AS THE NEED ARISES. A CHART INDICATES CONCEPTS TO BE TAUGHT IN GRADES K-3 FOR EACH OF THE FOUR AREAS AROUND WHICH THE PROGRAM IS DESIGNED. THESE AREAS ARE (1) THE EARTH, (2) LIVING THINGS, (3) ENERGY, AND (4) THE UNIVERSE. AT PRESENT THE RESOURCE

(cont. next page)

**DIALOG File 1: ERIC - 66-85/JUN**

UNITS SECTION OF THE SUPPLEMENT INCLUDES ONLY AN INTRODUCTORY SECTION ON "METHODS OF SCIENCE"--OTHER UNITS WILL BE ADDED AS THEY ARE DEVELOPED. COURSE CONTENT ASSIGNMENTS FOR K-12 ARE GIVEN IN CHART FORM. IN ADDITION TO THE INTRODUCTORY MATERIAL, SECTIONS OF THE SUPPLEMENT ARE (1) CONCEPTS, (2) RESOURCE UNITS, (3) ANNOTATED BIBLIOGRAPHY, BOOKS, (4) ANNOTATED BIBLIOGRAPHY, FILMS, AND (5) EQUIPMENT AND SUPPLIES. (DH)

Descriptors: Astronomy; Bibliographies; Biology; *Curriculum ; *Curriculum Development; Earth Science; *Elementary School Science; Grade 3; Instructional Materials; Physical Sciences; Science Activities; Science Curriculum; Science Equipment; Science Materials; *Teaching Guides

Identifiers: MINNESOTA; Minnesota (Minneapolis)

ED019230 SE003931

**REORGANIZED SCIENCE CURRICULUM, 6C, SIXTH GRADE SUPPLEMENT.**

Minneapolis Special School District Number 1, Minn.

132P.

EDRS Price - MF01/PC06 Plus Postage.

Language: ENGLISH

Journal Announcement: CUMREPT

THE ELEVENTH IN A SERIES OF 17 VOLUMES, THIS VOLUME PROVIDES THE SIXTH GRADE TEACHER WITH A GUIDE TO THE REORGANIZED SCIENCE CURRICULUM OF THE MINNEAPOLIS PUBLIC SCHOOLS. THE MATERIALS ARE INTENDED TO BE AUGMENTED AND REVISED AS THE NEED ARISES. THIS VOLUME, 6C, IS ONE OF THREE COMPRISING THE SIXTH GRADE SUPPLEMENT, AND CONTAINS THE SECTIONS ON (1) BIBLIOGRAPHY, BOOKS, (2) BIBLIOGRAPHY, FILMS, AND (3) EQUIPMENT AND SUPPLIES. VOLUME 6A CONTAINS A RESOURCE UNIT RELATED TO CHEMISTRY, AND VOLUME 6B A RESOURCE UNIT FOR SPACE TRAVEL. (DH)

Descriptors: *Astronomy; *Bibliographies; Biology; *Chemistry; *Curriculum; *Curriculum Development; Earth Science; Elementary School Science; Grade 6; Instructional Materials; Physical Sciences; Science Equipment; Science Materials; Teaching Guides

Identifiers: MINNESOTA; Minnesota (Minneapolis)

ED019227 SE003928

**REORGANIZED SCIENCE CURRICULUM, 6A, SIXTH GRADE SUPPLEMENT.**

Minneapolis Special School District Number 1, Minn.

01DEC1964 152P.

EDRS Price - MF01/PC07 Plus Postage.

Language: ENGLISH

Journal Announcement: CUMREPT

THE NINTH IN A SERIES OF 17 VOLUMES, THIS VOLUME PROVIDES THE SIXTH GRADE TEACHER WITH A GUIDE TO THE REORGANIZED SCIENCE CURRICULUM OF THE MINNEAPOLIS PUBLIC SCHOOLS. THE MATERIALS ARE INTENDED TO BE AUGMENTED AND REVISED AS THE NEED ARISES. THE SIXTH GRADE SUPPLEMENT IS IN THREE VOLUMES. VOLUME 6A HAS A DETAILED OUTLINE OF THE SUBJECT MATTER FOR GRADE 6 IN EACH OF THE FOLLOWING MAJOR AREAS AROUND WHICH THE CURRICULUM IS DESIGNED--(1) THE EARTH, (2) LIVING THINGS, (3) ENERGY, AND (4) THE UNIVERSE. A CHART INDICATES GRADE CONTENT FOR THE ENTIRE K-12 PROGRAM. VOLUME 6A INCLUDES INTRODUCTORY MATERIAL AND SECTIONS CONCERNING (1) CONCEPTS, AND (2) RESOURCE UNITS, CHEMICAL ENERGY. VOLUME 6B CONTAINS A RESOURCE UNIT ON SPACE TRAVEL, AND VOLUME 6C CONTAINS RELATED SECTIONS FOR SIXTH GRADE MATERIALS ENTITLED (1) BIBLIOGRAPHY, BOOKS, (2) BIBLIOGRAPHY, FILMS, AND (3) EQUIPMENT AND SUPPLIES. (DH)

Descriptors: Astronomy; Biology; *Chemistry; *Curriculum; *Curriculum Development; Earth Science; *Elementary School Science; *Grade 6; Instructional Materials; Physical Sciences Science Activities; Science Curriculum; Teaching Guides

Identifiers: MINNESOTA; Minnesota (Minneapolis)

ED019219# SE002993

**SELECTED REFERENCES FOR EARTH SCIENCE COURSES.**

MATTHEWS, WILLIAM H., III

Earth Science Curriculum Project, Boulder, Colo.

MAR1964 1p.

Report No.: RS-2

Document Not Available from EDRS.

Language: ENGLISH

Journal Announcement: CUMREPT

LISTED ARE TEXTBOOKS, TEACHING GUIDES, PERIODICALS, AND OTHER REFERENCES CONTAINING CLASSROOM TEACHING AIDS, LABORATORY AND FIELD SUGGESTIONS, AND OTHER MATERIALS IN THE FIELDS OF ASTRONOMY, GEOLOGY, METEOROLOGY, OCEANOLOGY, AND PHYSICAL GEOGRAPHY. THEY ARE DESIGNED TO AID ELEMENTARY AND SECONDARY SCHOOL TEACHERS IN THE PRESENTATION OF EARTH SCIENCE SUBJECT MATTER. THE CITATIONS, IN GENERAL, ARE COMPLETE AND INCLUDE SUGGESTED USE AND LEVEL FOR MATERIALS. A LISTING OF PUBLISHERS AND THEIR ADDRESSES IS PROVIDED. THIS DOCUMENT IS AVAILABLE AS RS-2 FOR $0.35 FROM EDUCATIONAL BOOK DIVISION, PRENTICE-HALL, INC., ENGLEWOOD CLIFFS, NEW JERSEY 07632. (DS)

Descriptors: *Astronomy; Bibliographies; Career Planning; Careers; College Science; Conservation Education; *Earth Science; Elementary School Science; Field Trips; *Geology; *Instruction; *Instructional Materials; Laboratory Manuals; Meteorology; Oceanography; Physical Geography; Reference Materials; Resource Materials; Secondary School Science; Teaching Guides; Textbooks

Identifiers: EARTH SCIENCE CURRICULUM PROJECT; NATIONAL SCIENCE FOUNDATION

ED017468 SE004232

**HELPING CHILDREN LEARN SCIENCE, A SELECTION OF ARTICLES REPRINTED FROM SCIENCE AND CHILDREN.**

HOPMAN, ANNE B.

National Science Teachers Association, Washington, D.C.

1966 195P.

EDRS Price - MF01 Plus Postage. PC Not Available from EDRS.

Language: ENGLISH

Journal Announcement: CUMREPT

INCLUDED ARE SELECTED ARTICLES FROM "SCIENCE AND CHILDREN" COVERING THE PERIOD SEPTEMBER 1963 THROUGH MAY 1966. THE SELECTION CRITERIA WERE THAT THE ARTICLES (1) PRESENT MATERIAL

(cont. next page)

DIALOG File 1: ERIC - 66-85/JUN

WHICH IS CONSISTENT WITH ACCEPTED PHILOSOPHY AND PRACTICES AND WITH THE LATEST TRENDS IN SCIENCE EDUCATION, AND (2) PROVIDE USABLE MATERIAL FOR CLASSROOM TEACHERS, CURRICULUM PERSONNEL, AND ADMINISTRATORS WHO ARE NOT SPECIALISTS. THE SELECTED ARTICLES ARE PRESENTED IN FIVE CATEGORIES--(1) OBJECTIVES FOR TEACHING SCIENCE, (2) BACKGROUND INFORMATION FOR THE TEACHER OF SCIENCE, (3) RESOURCES FOR TEACHING-LEARNING, (4) CLASSROOM TEACHING-LEARNING EXPERIENCES, AND (5) EXPERIMENTAL SCIENCE CURRICULUM STUDIES. (DS)

Descriptors: Astronomy; Biology; Chemistry; Concept Formation; Conservation Education; *Curriculum; *Curriculum Development; Disadvantaged Youth; *Educational Objectives; Educational Programs; *Elementary School Science; Field Trips Geology; *Instructional Materials; Learning; Oceanography; Outdoor Education; Problem Solving; *Resource Materials; *Science Activities; Science Course Improvement Projects; *Science Education; *Science Equipment; Science Fairs

ED016628# SE004125

**SCIENCE AND ENGINEERING REFERENCE SOURCES, A GUIDE FOR STUDENTS AND LIBRARIANS.**

MALINOWSKY, HAROLD ROBERT

Kansas Univ., Lawrence.

1967 1p.

Document Not Available from EDRS.

Language: ENGLISH

Journal Announcement: CUMREPT

THIS TEXTBOOK IS INTENDED AS A GENERAL GUIDE TO THE SOURCES OF INFORMATION IN THE SCIENCE-ENGINEERING FIELD. REFERENCES TO STANDARD SOURCES ARE LISTED FOR THE FIELDS OF (1) GENERAL SCIENCE, (2) MATHEMATICS, (3) PHYSICS, (4) CHEMISTRY, (5) ASTRONOMY, (6) GEOLOGY, (7) BIOLOGY, (8) ENGINEERING, AND (9) MEDICINE (LIMITED). WORKS IN ENGLISH ARE STRESSED, THOUGH MAJOR FOREIGN WORKS ARE INCLUDED. THE FIRST PART OF THE TEXT DEALS WITH "USING THE SCIENCE-ENGINEERING LITERATURE," AND DEALS WITH--(1) TYPES OF LITERATURE, (2) LITERATURE SEARCHING, (3) PATENTS, (4) TECHNICAL REPORTS, AND (5) ABSTRACTING. THE SECOND PART ON "SOURCES OF INFORMATION IN SCIENCE-ENGINEERING," IS ARRANGED ACCORDING TO DISCIPLINE, EACH CHAPTER CONTAINING (1) EXAMPLES OF LITERATURE TYPES, (2) RELATED PROBLEMS, AND (3) REFERENCE BOOKS BY CATEGORY. TYPES OF REFERENCES LISTED ARE (1) GUIDES TO LITERATURE, (2) HANDBOOKS, (3) DICTIONARIES, (4) ENCYCLOPEDIAS, (5) HISTORIES, (6) ABSTRACTS, (7) INDEXES, (8) BIBLIOGRAPHIES, (9) BIOGRAPHIES, AND (10) PERIODICALS. ALL ENTRIES ARE NUMBERED AND GENERALLY INCLUDE BRIEF DESCRIPTIVE ANNOTATIONS. THE NEED FOR PERIODIC REVISION OF THIS TYPE OF BOOK IS ACKNOWLEDGED, AND A BIBLIOGRAPHY OF REFERENCES PERTAINING TO REFERENCE PROBLEMS IN THE SCIENCE-ENGINEERING FIELD IS INCLUDED. THERE IS AN AUTHOR-SUBJECT INDEX TO THE 435 REFERENCES CONTAINED IN THE TEXT. THIS DOCUMENT IS AVAILABLE FROM LIBRARIES UNLIMITED, INCORPORATED, BOX 9842, ROCHESTER, NEW YORK 14623. (DH)

Descriptors: *Bibliographies; *Engineering; *Information Sources; *Instructional Materials; Library Materials; *Mathematics; Reference Materials; *Sciences

ED011236 SE000047

**THE RELATIONSHIP OF THREE FACTORS IN PRINTED MATERIALS TO STUDENT ACHIEVEMENT.**

EATON, EDWARD J.

MAR1966 13P.

EDRS Price - MF01/PC01 Plus Postage.

Journal Announcement: DH6667

THE EFFECT OF PLANNED DIFFERENCES IN TEXTUAL MATERIALS ON ELEMENTARY STUDENTS' SCIENCE ACHIEVEMENT AND ATTITUDES WAS INVESTIGATED. A CHAPTER FROM A RECENT SCIENCE TEXT WAS REWRITTEN IN SIX DIFFERENT FORMS WHICH EMPHASIZED OR DEEMPHASIZED QUESTIONS, ACTIVITIES, OR INCONGRUITIES INCLUDED IN THE ORIGINAL FORM. THE MATERIALS WERE RANDOMLY ASSIGNED TO 35 SIXTH-GRADE CLASSES IN 13 SCHOOLS. STUDENTS WERE PRETESTED AND POST-TESTED FOR ACHIEVEMENT. THE POST-TEST INCLUDED QUESTIONS RELATED TO STUDENT ATTITUDES TOWARD ASTRONOMY AND THE INSTRUCTIONAL MATERIALS. DIFFERENCES IN ACHIEVEMENT BETWEEN TREATMENT GROUPS WERE DETERMINED THROUGH ANALYSIS OF COVARIANCE. ALL SUBGROUPS ANALYZED, EXCEPT FEMALES WITH MENTAL AGES IN THE UPPER QUARTILE OF THE SAMPLE, SHOWED SIGNIFICANT GAINS IN ACHIEVEMENT. ACTIVITY PRODUCED THE HIGHEST ACHIEVEMENT SCORES FOR THE MAJORITY OF THE STUDENTS. STUDENTS WITH MENTAL AGES IN THE UPPER QUARTILE, HOWEVER, SCORED HIGHER WHEN ACTIVITY WAS DEEMPHASIZED. A DEFINITE RELATIONSHIP WAS IDENTIFIED BETWEEN THE LEARNING MATERIALS WITH THE GREATEST NUMBER OF ACTIVITIES AND FAVORABLE STUDENT ATTITUDES. THIS ARTICLE IS PUBLISHED IN THE "JOURNAL OF RESEARCH IN SCIENCE TEACHING," VOLUME 4, ISSUE 1, 1966. (AG)

Descriptors: *Academic Achievement; *Astronomy; *Curriculum *Elementary School Science; Evaluation; Grade 6; Instructional Materials; *Student Attitudes

Identifiers: ELEMENTARY SCHOOL SCIENCE PROJECT; FLORIDA

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# APPENDIX A

## 1985 AEMN NETWORK SUBMISSION FORMS

# Astronomy Education Materials Network



Dennis W. Sunal
Astronomy Education Materials Network
Dept. of Curriculum and Instruction
West Virginia University
Morgantown, WV 26506

The Astronomy Education Materials Network has been designed to inform school and non-school educators of the existence of non-commercially developed materials, and to provide an opportunity to contribute to the dissemination and exchange process. Astronomy education materials such as the following are again being solicited for an updated 1985 Resource Guide: locally developed curricula, instructional modules, lab and field activities, assessment instruments, slide and video tape presentations, films, games, simulations, planetarium lessons and labs, computer simulations, and descriptions of instructional strategies which will help provide principal components of an activity oriented astronomy curriculum.

Guidelines for the submission of materials have been established as follows:

1. Materials must be easily used at other facilities without major investments and modifications.
2. Developers of materials must be willing to disseminate materials at cost direct to the purchaser.
3. Each potential submission to the network must be accompanied by a materials submission form with all items completed.
4. One complimentary copy of all materials must be submitted with the submission form to establish a clearinghouse for the astronomy education materials. Materials not used will be returned.

In the Summer of 1985 an Astronomy Education Materials Resource Guide - 1985 Edition will be published which will provide listings describing all newly submitted materials and how they can be obtained. All persons submitting at least one entry will receive one copy sent free of charge. Otherwise, the Resource Guide will be available for a cost to be determined later.

For further information, materials submission forms and submission of materials for the 1985 Guide write:

Dennis Sunal
Astronomy Education Materials Network
Department of Curriculum and Instruction
604 Allen Hall
West Virginia University
Morgantown, WV 26506

Supported by the V. M. Slipher Fund of the National Academy of Sciences and West Virginia University



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# Astronomy Education Materials Network



*** Return to ***

Dennis W. Sunal
Astronomy Education Materials Network
Dept. of Curriculum and Instruction
West Virginia University
Morgantown, WV 26506

1985 ASTRONOMY EDUCATION MATERIAL SURVEY FORM

1. TOPIC: _____

2. Target Groups:
   - classroom _____
   - workshop _____
   - field _____
   - ages 0-9 _____
   - ages 10-14 _____
   - ages 15-adult _____

   other _____

   Potential Uses:
   - course component _____
   - full course _____
   - self-instructional _____
   - large group _____
   - Teacher education _____
   - other _____

3. Goals: (overall goals - to introduce students to celestial coordinates)

4. Nature of activities/content: (concise statements describing materials and how they can be used - students find astronomical objects on maps given coordinates, etc.)

5. Complete the following:
   State of Development: Early _____ Revised _____ Final _____
   Number of sessions _____ length of sessions _____
   Instructor materials provided: yes ____ no ____
   Student Evaluation Materials included : yes ____ no ____
   Bibliographical References for Students: yes ____ no ____
   Requires additional materials or equipment: yes ____ no ____ If yes, explain
   _____

6. Instructional Format:
   Field(access to sky) daytime ____ night ____ printed material ____
   audio tape ____ video tape ____ slide/filmstrip/loop/film ____(which one)
   Planetarium ____ computer or computer assisted instruction____
   Other _____

7. Evaluation of Materials:
   Number of Field test groups _____ total number of students _____
   Number of Schools/Institutions _____
   Describe Evidence of Effectiveness:

8. Cost per Item: _____

Local Reproduction Privileges Granted by Author: yes ____ no ____
Source of Materials: Developer - If different than publisher
Write to (Name and Address)

_____ _____
_____ _____
_____ _____

ample

ASTRONOMY EDUCATION MATERIAL SURVEY FORM - ALL LEVELS

Sample

Please see suggestions on back

1. TOPIC: Construction and Use of a Model of Nearby Space

2. Target Groups:

| | |
|---|---|
| classroom | ____ |
| workshop | ____ |
| field | ____ |
| ages 0-9 | ____ |
| ages 10-14 | ____ |
| ages 15-adult | ✓ |

Potential Uses:

| | |
|---|---|
| course component | ✓ |
| full course | ____ |
| self-instructional | ____ |
| large group | ____ |
| Teacher education | ____ |
| other | Workshop |

other introductory college level, non science students, high school science class

3. Goals: (overall goals - to introduce students to celestial coordinates)
to help students determine relationships between organizational components of nearby space - earth, orbit, solar system, local group of stars, local galaxy.

4. Nature of activities/content: (concise statements describing materials and how they can be used - students find astronomical objects on maps given coordinates, etc.)
Series of worksheets and discussion sheets which help students to
1) make direct observations and record measurements of tonights skyobjects
2) use this information to construct 3-D model of nearby space
3) investigate the relationship of solar system with nearby stars.
Planetarium sessions mixed and integrated with laboratory activities.

5. Complete the following:
State of Development: Early ____ Revised ✓ Final ____
Number of sessions 5 length of sessions 2 hours
Instructor materials provided: yes ✓ no ____ planetarium outlines
Student Evaluation Materials included: yes ✓ no ____
Bibliographical References for Students: yes ✓ no ____
Requires additional materials or equipment: yes ____ no ____ If yes, explain
Planetarium 3 One hour sessions (2 if outside observing done)
also, protractors, ruler, posterboard, scissors, glue, compass and paper.

6. Instructional Format:
Field(access to sky) daytime ____ night ____ printed material ✓
audio tape ____ video tape ____ slide/filmstrip/loop/film ____ (which one)
Planetarium ✓ computer or computer assisted instruction ____
Other Laboratory activities, Film - How Vast is Space (in 10 steps)

7. Evaluation of Materials:
Number of Field test groups 6 total number of students 150
Number of Schools/Institutions 1
Describe Evidence of Effectiveness:
research study in progress

8. Cost per item: ~100 pages $5.00 + Postage ($1.00) = $6.00

Local Reproduction Privileges Granted by Author: yes ✓ no ____

Source of Materials: Developer - If different than publisher
Write to (Name and Address)

Dennis W. Sunal
604-M Allen Hall
Dept of Curriculum and Instruction
West Virginia University
Morgantown WV 26506

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Sample

# APPENDIX B

# FUTURE UPDATE AEMN NETWORK SUBMISSION FORMS

## Astronomy Education Materials Resource Guide

Teaching materials are being solicited for a future publication by the Astronomy Education Materials Network. This national network has been designed to inform school and non-school educators of the existence of non-commercially developed materials, and to provide an opportunity to contribute to the dissemination and exchange process. Astronomy education materials such as the following are again being solicited for an updated 1985 Resource Guide: lesson activities, locally developed curricula, instructional modules, lab and field activities, assessment instruments, slide and video tape presentations, films, games, simulations, planetarium lessons and labs, computer simulations, and descriptions of instructional strategies -- Materials which will help provide the principal components of an activity-oriented curriculum.

Guidelines for the submission of materials have been establishes as follows:

1. Materials must be easily used at other facilities without major investments and modifications.
2. Developers of materials must be willing to disseminate materials at cost direct to the purchaser.
3. Each potential submission to the network must be accompanied by a materials sumbission form with all items completed.
4. One complementary copy of all materials must be submitted with the submission form to establish a clearinghouse for the astronomy education materials. Materials not used will be returned.

In the Fall of 1986 an Astronomy Education Materials Resource Guide - Update will be published which will provide these up-to-date listings describing all submitted materials and how they can be obtained. All persons submitting at least one entry will receive one copy sent free of charge. Otherwise, the Resource Guide will be available for a cost to be determined.

For further information, materials submission forms and submission of materials for the 1986 Guide write:

Dennis Sunal
Astronomy Education Materials Network
Division of Education
604 Allen Hall
West Virginia University
Morgantown, WV 26506

Still available is the 1985 Astronomy Education Materials Resource Guide, which doubles the number of resources listed in the previous Guide. Greatly expanded sections are astronomy computer software, classroom lessons and units. To obtain more that 100 pages of detailed descriptions of astronomy education resources write:

1985 Astronomy Resource Guide
West Virginia University Bookstore
College Avenue
Morgantown, WV 26506

Supported by the V. M. Slipher Fund of the National Academy of Sciences and West Virginia University

# Astronomy Education Materials Network

*** Return to ***

**Dennis W. Sunal**
**Astronomy Education Materials Network**
**Dept. of Curriculum and Instruction**
**West Virginia University**
**Morgantown, WV 26506**

## 1986 ASTRONOMY EDUCATION MATERIAL SURVEY FORM

1. TOPIC: _____

2. Target Groups:

| | | Potential Uses: | |
|---|---|---|---|
| classroom | _____ | course component | _____ |
| workshop | _____ | full course | _____ |
| field | _____ | self-instructional | _____ |
| ages 0-9 | _____ | large group | _____ |
| ages 10-14 | _____ | Teacher education | _____ |
| ages 15-adult | _____ | other _____ | _____ |

other _____

3. Goals: (overall goals - to introduce students to celestial coordinates)

4. Nature of activities/content: (concise statements describing materials and how they can be used - students find astronomical objects on maps given coordinates, etc.)

5. Complete the following:
   State of Development: Early ____ Revised ____ Final ____
   Number of sessions _____ length of sessions _____
   Instructor materials provided: yes ____ no ____
   Student Evaluation Materials included : yes ____ no ____
   Bibliographical References for Students: yes ____ no ____
   Requires additional materials or equipment: yes ____ no ____ If yes, explain
   _____

6. Instructional Format:
   Field(access to sky) daytime ____ night ____ printed material ____
   audio tape ____ video tape ____ slide/filmstrip/loop/film ____(which one)
   Planetarium ____ computer or computer assisted instruction____
   Other _____

7. Evaluation of Materials:
   Number of Field test groups _____ total number of students _____
   Number of Schools/Institutions _____
   Describe Evidence of Effectiveness:

8. Cost per item: _____

Local Reproduction Privileges Granted by Author: yes ____ no ____
Source of Materials: Developer - If different than author
Write to (Name and Address)

_____ _____
_____ _____
_____ _____

Sample



ASTRONOMY EDUCATION MATERIAL SURVEY FORM - ALL LEVELS

Sample

Please see suggestions on back

1. TOPIC: Construction and Use of a Model of Nearby Space

2. Target Groups:
   - classroom ____
   - workshop ____
   - field ____
   - ages 0-9 ____
   - ages 10-14 ____
   - ages 15-adult ✓
   - other introductory college level, non science students, high school science class

   Potential Uses:
   - course component ✓
   - full course ____
   - self-instructional ____
   - large group ____
   - Teacher education ____
   - other Workshop

3. Goals: (overall goals - to introduce students to celestial coordinates)
   To help students determine relationships between organizational components of nearby space - earth, orbit, solar system, local group of stars, local galaxy.

4. Nature of activities/content: (concise statements describing materials and how they can be used - students find astronomical objects on maps given coordinates, etc.)
   Series of worksheets and discussion sheets which help students to
   1) make direct observations and record measurements of tonights skyobjects
   2) use this information to construct 3-D model of nearby space
   3) investigate the relationship of solar system with nearby stars.
   Planetarium Sessions mixed and integrated with Laboratory activities.

5. Complete the following
   State of Development: Early ____ Revised ✓ Final ____
   Number of sessions 5 length of sessions 2 hours
   Instructor materials provided: yes ✓ no ____ Planetarium outlines
   Student Evaluation Materials included: yes ✓ no ____
   Bibliographical References for Students: yes ✓ no ____
   Requires additional materials or equipment: yes ____ no ____ If yes, explain
   Planetarium 3 One hour sessions (2 if outside observing done)
   also, Protractors, ruler, posterboard, scissors, glue, compass and paper.

6. Instructional Format:
   Field(access to sky) daytime ____ night ____ printed material ✓
   audio tape ____ video tape ____ slide/filmstrip/loop/film ____ (which one)
   Planetarium ✓ computer or computer assisted instruction ____
   Other Laboratory activities, Film - How Vast is Space (in 10 steps)

7. Evaluation of Materials:
   Number of Field test groups 6 to al number of students 150
   Number of Schools/Institutions 1
   Describe Evidence of Effectiveness:
   research study in progress

8. Cost per item: ~100 pages 5.00 + Postage ($1.00) = $6.00

Local Reproduction Privileges Granted by Author: yes ✓ no ____
Source of Materials: Developer - If different than publisher
Write to (Name and Address)

Dennis W. Sural
604-M Allen Hall
Department of Curriculum and Instruction
West Virginia University
Morgantown WV 26506



Sample

# APPENDIX C
# AEMN NETWORK QUESTIONNAIRE

# Astronomy Education Materials Network

(for non-commercially produced and published materials)

AEMN QUESTIONNAIRE

**Dennis W. Sunal**
**Astronomy Education Materials Network**
**Dept. of Curriculum and Instruction**
**West Virginia University**
**Morgantown, WV 26506**

You have participated in the Network for the past year either through sharing your instructional materials, requesting materials from others, or both.

Approximately 2100 Astronomy Education Materials Guides have been sent out to individuals, schools, libraries, observatories, teacher resource centers, and universities, etc. They were sent to most states in the U.S. and 15 foreign countries. It is appropriate at this time to evaluate the Network to determine its usefulness, strong points and weak points. Results of this evaluation will be printed in the 1985 Astronomy Education Materials Resource Guide due to be published in September.

Please take time to complete the items below as soon as possible. Please don't put it off. Through return of this questionnaire your name will be put on a mailing list informing you of future Network publications.

* * * * *

PART I: FOR NETWORK PARTICIPANTS WHOSE MATERIALS WERE PART OF THE 1982 GUIDE

1. Title of item(s) included in the 1982 Astronomy Education Materials Guide.

   _____

   _____

   _____

2. Comments on the final write-up of your material as it appeared in the guide:

   _____

   _____

   _____

3. Number of requests for your material you received (that you believe to be related to the publication of the Guide):

   _____ requests recieved and filled

   Provide a summary of comments you have received about your material.

   _____

   _____

   _____

   _____

4. If the 1982 or Volume 2 of the Astronomy Education Materials Resource Guide were reprinted (3rd ed.), would you participate by including your materials for this edition? The 3rd edition will be substantially enlarged in number of entries.

_____ yes _____ no

If so, what changes in the description would you recommend? (You would receive a free copy if it was reprinted.)

_____

_____

_____

_____

PART II: FOR ALL NETWORK USERS

1. How many titles did you request over the past year from the 1982 Astronomy Education Materials Resource Guide?

Titles Requested (and paid for if a charge was required) # _____

Titles Received # _____

2. Comments on this request process as you experienced it (e.g., worked well, had these problems, these changes should be made, etc.)

_____

_____

_____

_____

3. Comments on the quality of the materials you received. (Did they work for you?)

_____

_____

_____

_____

4. What type of materials would you want more of in the new 1985 Astronomy Education Materials Resource Guide?

1 high priority 2 low priority 3 should not be included

_____ a) Curriculum guides for whole grade or many grade levels

_____ b) Media (films, slides, pictures, planetarium programs. . .)

_____ c) Computer software (type of microcomputer _____ )

_____ d) Instructional program aids (games, manipulatives, equipment. . .)

_____ e) Astronomy lesson plans (small set or unit)

_____ f) Astronomy lab activities

_____ g) Resource materials for teaching astronomy (e.g., sky calendar, sources for materials. . .)

_____ h) Workshop guides for teaching astronomy

_____ i) Other (describe)

_____ j) Other (describe)

5. Other comments about the Network

_____

_____

_____

6. Through what source did you originally hear about the Astronomy Education Materials Resource Guide?

_____

_____

7. Do you plan to submit one or more of your ideas or class materials to share in the Network this year? A free guide will be went if you do!

_____ yes _____ no

If so, give title _____

Please read enclosed instructions and complete enclosed Survey form for title(s) above.

Than your for your cooperation.

Please mail the completed questionnaire to:

Dennis W. Sunal
Astronomy Education Materials Network
Division of Education
West Virginia University
Morgantown, WV 26506

# APPENDIX D
# SAMPLE AEMN MATERIAL REQUEST FORMS

ASTRONOMY EDUCATION MATERIALS RESOURCE GUIDE
SAMPLE REQUEST FORM

Name of Material Requested _____

Cost _____ Payment enclosed (or purchase order for requests of $4.00 or more)

Send to:

Name_____

Address _____

_____

_____

Authors would appreciate your evaluative comments upon receipt of the material

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ASTRONOMY EDUCATION MATERIALS RESOURCE GUIDE
SAMPLE REQUEST FORM

Name of Material Requested _____

Cost _____ Payment enclosed ( or purchase order for requests of $4.00 or more)

Send to:

Name _____

Address: _____

_____

_____

Authors would appreciate your evaluative comments upon receipt of the material.